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ABSTRACT

This paper describes a 3-year evaluation of Core Knowledge Sequence implementation in 12 schools nationwide. The Core Knowledge Sequence, a whole-school curricular reform model, provides a planned progression of specific topics to teach in language arts, history, geography, math, science, and fine arts for grades 4-6. The evaluation determined conditions under which Core Knowledge would achieve reasonably full implementation and the effects of Core Knowledge implementation in various contexts. Evaluation involved longitudinal case studies of schools (site visits, interviews, focus groups, observations, and teacher surveys). First and third graders in intervention and comparison schools completed basic skills and core knowledge testing at the beginning and end of the study. After 3 years, all 12 schools were still implementing the Core Knowledge Sequence, though only 10 authentically, and 9 had reached moderate or high implementation levels. Multilevel support for change was necessary for success. Implementing Core Knowledge helped make instruction more interesting and content-rich, provided curricular coherence, and helped increase teacher collaboration and professionalism. Core Knowledge effect sizes for all Core Knowledge test outcomes were large and educationally meaningful. When schools implemented the sequence with greater reliability and consistency, students achieved improved outcomes on all tests. (Contains 51 references.) (SM)

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CRESPAR

NATIONAL EVALUATION OF CORE KNOWLEDGE SEQUENCE IMPLEMENTATION

Final Report

Sam Stringfield
Amanda Datnow
Geoffrey Borman
Laura Rachuba

Report No. 49 / December 2000

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JOHNS HOPKINS UNIVERSITY & HOWARD UNIVERSITY

CENTER FOR RESEARCH ON THE EDUCATION OF STUDENTS PLACED AT RISK

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49. *National Evaluation of Core Knowledge Sequence Implementation: Final Report*—S. Stringfield, A. Datnow, G. Borman, L. Rachuba
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THE CENTER

Every child has the capacity to succeed in school and in life. Yet far too many children, especially those from poor and minority families, are placed at risk by school practices that are based on a sorting paradigm in which some students receive high-expectations instruction while the rest are relegated to lower quality education and lower quality futures. The sorting perspective must be replaced by a "talent development" model that asserts that all children are capable of succeeding in a rich and demanding curriculum with appropriate assistance and support.

The mission of the Center for Research on the Education of Students Placed At Risk (CRESPAR) is to conduct the research, development, evaluation, and dissemination needed to transform schooling for students placed at risk. The work of the Center is guided by three central themes — ensuring the success of all students at key development points, building on students' personal and cultural assets, and scaling up effective programs — and conducted through research and development programs in the areas of early and elementary studies; middle and high school studies; school, family, and community partnerships; and systemic supports for school reform, as well as a program of institutional activities.

CRESPAR is organized as a partnership of Johns Hopkins University and Howard University, and supported by the National Institute on the Education of At-Risk Students (At-Risk Institute), one of five institutes created by the Educational Research, Development, Dissemination and Improvement Act of 1994 and located within the Office of Educational Research and Improvement (OERI) at the U.S. Department of Education. The At-Risk Institute supports a range of research and development activities designed to improve the education of students at risk of educational failure because of limited English proficiency, poverty, race, geographic location, or economic disadvantage.

Executive Summary

This is the final report of a three-year evaluation of Core Knowledge Sequence implementation in 12 schools nationwide. The Core Knowledge Sequence, a whole-school curricular reform model, provides a planned progression of specific topics to teach in language arts, history, geography, math, science, and the fine arts for Grades K-6 (Core Knowledge Foundation, 1995, 1998). The major goals of this evaluation were to determine (a) the conditions under which Core Knowledge is likely to achieve reasonably full implementation, and (b) the effects of Core Knowledge Sequence implementation in a variety of contexts.

The 12 Core Knowledge schools (six promising or new implementation sites and six advanced implementation sites) in this study are located in seven states (Colorado, Florida, Ohio, Maryland, Tennessee, Texas, Washington) and are situated in various community (urban, rural, suburban), racial, and socio-economic contexts. Approximately half of the schools serve a majority population of students who are eligible for the federal free- or reduced-price lunch program.

Implementation Results: At the end of three years (1998), all 12 schools were still implementing the Core Knowledge Sequence. Nine of the 12 schools had reached moderate or high levels of implementation. Core implementation improved and increased dramatically in four of the six new sites over the past three years. In fact, some of these sites reached implementation levels that are consistent with, if not superior to, some of the advanced sites. Implementation also improved or remained at consistently high levels in five of the six advanced implementation sites. Core Knowledge implementation waned over time considerably in one of the original advanced sites and one of the original promising sites, leading us to conclude that while all 12 schools reported that they were implementing Core Knowledge, 10 schools were authentically doing so.

Components for Successful Implementation: Multilevel support for change was required for Core Knowledge to be successfully implemented. Successful implementation relied on instructional leadership from the principal, teacher willingness to change, and support from the district or at least a commitment that the district would enable rather than hinder long-term implementation. Successful implementation also relied upon fiscal resources to provide for the purchase of Core materials and paid teacher planning time, as well as the organization of time, space, and professional development designed to support Core. Core Knowledge implementation was hindered by the absence of multilevel support and the presence of strong pressures to comply with state standards and accountability systems that were ill-aligned with Core. Such pressure, wherever present, diverted educators from Core implementation. Core Knowledge was not effectively implemented in highly troubled school sites experiencing serious difficulties with school climate and discipline.

The Effects of Core Knowledge Implementation on Schooling Practice: Implementing Core Knowledge consistently contributed to making instruction more interesting and content-rich for students, provided coherence to the curriculum, and contributed to increased teacher collaboration and professionalism. Core Knowledge was also associated with more hands-on, activity-based instruction. However, it should be noted that these approaches are not officially sanctioned by the Core Knowledge Foundation, and methods for teaching Core were chosen by each local school and its teachers. Core Knowledge implementation was also associated with greater academic engaged time in schools. These qualitative outcomes suggest changes in schooling practice. However, while Core adds substantially to teachers' professional lives, one side effect (often viewed negatively) associated with this is that planning for teaching Core is very work intensive.

Achievement Outcomes: The quantitative component of this evaluation examined (a) experimental-control differences in achievement gains over three years, (b) the relationships between level of implementation and academic gains, and (c) differences in gain by cohort (one cohort was followed from first through third grade at each school, and a second cohort was followed from third through fifth grade). For both cohorts, Core Knowledge effect sizes for the Core Knowledge test outcomes were large, and educationally meaningful. The analyses of norm-referenced reading and math scores yielded similar outcomes for Core Knowledge and comparison schools. However, strong correlations between level of implementation and norm-referenced math and reading gains indicate that when schools implemented the Core Knowledge Sequence with greater consistency, students achieved improved outcomes in both subjects.

Why did Core Knowledge implementation lead to positive effects? The most plausible explanation for the positive effects associated with Core Knowledge is the greater curricular coherence it creates within individual schools. Core Knowledge implementation produced more clarity of goals, less repetitiveness in the curriculum, and more content-rich instruction for students. Where successfully implemented, Core Knowledge had become a vehicle for much more lively professional discussion and sharing among teachers. However, what appears to have mattered most was the fact that the curriculum was *specified*, and less so that it was *Core Knowledge* content. This leads us to the conclusion that the benefits associated with a specified curriculum may not be limited to Core Knowledge per se, but instead may be applicable to other specified curricula, even a fully articulated curricular sequence developed by schools themselves—so long as the content covered is broad, sequential, and well grounded in theory and research.

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I. Introduction

Enter the main door of the school and you are welcomed by a collection of African masks. A bulletin board on which students have drawn maps of their neighborhood and identified examples of Greek architecture grabs your attention as you stroll down the hallway. Another map shows places where Vikings traveled and traded around the world. Still another bulletin board displays the similarities and differences between Mayan and Egyptian pyramids.

Displays and dioramas of student work dot the hallway. Pieces of silver and the picture of George Washington saved by Dolly Madison complete the students' varying interpretations of the burning of the White House during the War of 1812. A table displays reconstruction of the Underground Railroad....

Peer into classrooms and you will see students involved in exciting interdisciplinary projects. While one class investigates the interactions of Newton's Laws on the exciting world of amusement park rides, another class analyzes the chain of events in Shakespeare's Macbeth... On a typical day, students are moving about the school. Some are scurrying to share their latest stories. Others are searching for evidence of heat exchange throughout the school. Still more are conducting interviews, asking students and staff who their heroes are and why.

— MENTZER & SHAUGHNESSY, 1996, P. 13

The above description of a Core Knowledge school in San Antonio, Texas, is written by two teachers. The school, Hawthorne Elementary, serves a low-income, predominantly Hispanic student population. We chose to include this description in our report because it very accurately captures the essence of the schools we visited as part of a national evaluation of the implementation of the Core Knowledge Sequence.

The Core Knowledge Sequence, a whole-school curricular reform model, provides a planned progression of specific topics to teach in language arts, history, geography, math, science, and the fine arts. It is designed so that students build on knowledge from year to year in grades K-6 (Core Knowledge Foundation, 1995, 1998). The Core Knowledge Sequence of topics is intended to constitute half of a school's curriculum. The most distinguishing feature of the Core Knowledge Sequence is its content specificity. While the Core Knowledge Sequence specifies content, it does not specify pedagogical strategies. It also does not specify plans for implementation, providing only general guidelines for how a school might implement the sequence (Jones, 1991).

E.D. Hirsch, Jr., a professor of English at the University of Virginia, first presented the thesis behind the Core Knowledge Sequence in his controversial bestseller, *Cultural Literacy* (1987). In *Cultural Literacy,* Hirsch provided a list of what every American should know. The book was criticized as promoting arbitrarily decided, elitist forms of knowledge. Responding to that criticism, Hirsch convened an advisory board of experts in multiculturalism and consulted an independent group of educators, scholars, and scientists to attempt to make a master list of content topics for

Grades K-6 that was inclusive of diverse perspectives. The Core Knowledge Foundation maintains that "Core Knowledge is an *anti*-elitist idea. It aims to guarantee *equal access for all* to the knowledge necessary for higher literacy and learning" (Core Knowledge Foundation, 1998, p. 9).

The Core Knowledge Sequence was first piloted in 1990 in a Florida elementary school. Based on that implementation, significant revisions were made. Revisions continue to be made to the Sequence as the non-profit Core Knowledge Foundation, chaired by Hirsch, receives feedback from schools using the curriculum. The products of these ever evolving efforts can be seen in a series of books titled, *What Your First [2nd, 3rd, Etc.] Grader Needs to Know: Fundamentals of a Good First [2nd, 3rd, Etc.] Grade Education* (Hirsch, various dates). Educators from schools using the curriculum also convene annually at a national conference of Core Knowledge, during which time they share lessons and experiences.

Core Knowledge is growing in popularity. The Core Knowledge Sequence is taught in more than 800 schools nationwide, and the numbers continue to grow. In 1998, Core Knowledge was approved as research-based reform design under the federal Comprehensive School Reform Demonstration Program (CSRD).[1] This will likely lead to expanded implementation of Core Knowledge in schools (particularly Title I schools) across the country. Moreover, E.D. Hirsch's recent book, *The Schools We Need and Why We Don't Have Them* (1996), which provides strong support for Core Knowledge, has received positive press nationwide. A *New York Times* reviewer called *The Schools We Need* "the most important book on education in 1996" (Mosle, 1996).

Surprisingly, there has been only a modest amount of research on the implementation of the Core Knowledge Sequence. Analyzing data from a single school in San Antonio, Texas, Schubnell (1996) concluded that, "[W]ith respect to reading performance, the successive grade-level increases for Hawthorne in general show stronger upward trends than are evident in San Antonio Independent School District (SAISD) schools in the aggregate" (p. 39). In a three-year study of the first six Core Knowledge schools in the state of Maryland, Stringfield and McHugh (1998) found that, "[T]he majority of Core Knowledge schools posted three-year academic achievement gains in reading comprehension relative to their matched control peers as measured on a [norm-referenced test]. In addition, during the three-year period...third grade students in Core Knowledge schools showed greater gains [on the state's performance based test] than did their matched control schools or the mean of schools state-wide" (p. 1). This report represents the first systematic national evaluation of Core Knowledge implementation across multiple schools.

[1] The Comprehensive School Reform Demonstration Program, based on the bipartisan Porter-Obey Amendments of 1998, allows for $145 million of federal funding to go to schools adopting research-based reform models. The majority of the funding is allocated for Title I schools.

II. Overview of Evaluation

This evaluation was conducted by researchers at the Center for Social Organization of Schools at Johns Hopkins University and the College of Education at the University of Memphis. The goal of this evaluation was to determine the effects of Core Knowledge Sequence implementation in a variety of contexts. This three-year, longitudinal evaluation began in November, 1995 and ended in September, 1998. The major research questions of this evaluation were:

- What actions are necessary to achieve reasonably full implementation of Core Knowledge?
- Under what conditions is the implementation prognosis favorable, and under what conditions is Core Knowledge unlikely to achieve reasonably full implementation?
- As contrasted with reasonable controls, how effective is the Core Knowledge Sequence under conditions of reasonably full implementation?

In order to answer these questions, we conducted a study of six schools deemed by the Core Knowledge Foundation to be relatively advanced in their implementation of the Core Knowledge curriculum, and six schools deemed as new, promising implementation sites. For quantitative comparison purposes, control schools were chosen for four of the advanced implementation sites (control schools for two of these advanced implementation sites could not be found). The research design does not include control schools for the promising implementation sites.

The 12 Core Knowledge schools are located in seven states (Colorado, Florida, Ohio, Maryland, Tennessee, Texas, Washington) and are situated in various community (urban, rural, suburban), racial, and socio-economic contexts. Approximately half of the schools serve a majority population of students who are eligible for the federal free- or reduced-price lunch program. A list of the schools follows in Table 1. For the purpose of confidentiality, pseudonyms are used for all place and person names.

A. Qualitative Component

The qualitative component of this evaluation involved conducting longitudinal, comparative case studies (Yin, 1989) of the 12 Core Knowledge schools. In conducting these case studies, our research team visited each of the advanced implementation sites a total of five times over the course of the three-year study. A two-person team conducted each site visit. This involved two 2-3 day site visits in Year 1, one 2-3 day site visit in Year 2, and two 2-3 day site visits in Year 3. Our case studies of the new implementation sites involved only slightly less data gathering. We conducted two site visits in Year 1, a brief site visit in Year 2 (principal interview only), and two site visits in Year 3.

Table 1: List of Schools in Sample

School	Total # of Students	% Free- or Reduced-Price Lunch	Racial/Ethnic Composition
Florida ADVANCED *Woodlands*	922	31%	82.4% White 11.9% Black 4.7% Hispanic 1% Other
Florida CONTROL	475	34%	50% Black 48% White 2% Asian
Texas ADVANCED *Englewood*	487	96%	85% Hispanic 6% Black 8% White 1% Asian
Texas CONTROL	559	82%	96% Hispanic 3% White 1% Black
Maryland ADVANCED *Garvey*	450	63%	98% Black 2% Other
Maryland CONTROL	344	65%	96.7% Black 3% White 0.3% Asian
Washington ADVANCED *High Country*	492	29%	76% White 20% Hispanic 2% Asian 1% Black 1% Other
Washington CONTROL	480	38%	79% White 13% Hispanic 5% Black 3% Asian
Colorado ADVANCED *Peabody*	499	6%	90.8% White 4% Asian 3.2% Hispanic 1% Black 1% Native Am.
Ohio ADVANCED *Smithtown*	500	60%	100% White
Florida NEW *Alder*	670	52%	63% White 27% Black 10% Hispanic
Texas NEW *Riverside*	496	44%	55% White 25.2% Hispanic 17.1% Black 2.2% Asian 0.2% Native Am.
Maryland (1) NEW *Colonial*	403	74%	70% Black 30% White
Maryland (2) NEW *Vine*	606	10 %	84% White 14% Black 1% Hispanic 0.5% Asian 0.5% Native Am.
Colorado NEW *Newton*	280	6%	93.2% White 3.6% Hispanic 1.1% Black 0.4% Native Am.
Tennessee NEW *Carson*	500	86%	100% Black

Interviews. During our site visits, we used semi-structured protocols to conduct interviews and focus groups (Krueger, 1994) with school staff to determine the successes and challenges they faced in implementing the Core Knowledge Sequence. We interviewed principals (and sometimes assistant principals) during each visit. As we followed the first-through-third-grade cohort and the third-through-fifth-grade cohort from the beginning of our study onward, we interviewed first and third grade teachers in the first year, second and fourth grade teachers the second year (in advanced implementation sites), and third and fifth grade teachers the final year. Interviews with school district administrators and some parents were also conducted throughout the study, as well as fifth grade student focus groups in the final year. New interview protocols were developed for each round of site visits, based on ongoing data analyses and emerging questions. All interviews were taped and transcribed verbatim at the completion of each visit.

Classroom Observations. Our study involved following the achievement and schooling experiences of two cohorts of students over a three-year period. We conducted classroom observations at the first and third grade levels in 1995-96, at the second and fourth grade levels in 1996-1997 (in advanced sites only), and at the third and fifth grade levels in all of sites during the 1997-98 school year. These observations consisted of whole school day observations in classrooms the first year and two-to-three one-hour observations per teacher in each grade for each subsequent year.[2] In addition to recording qualitative running notes of classroom activities, we employed an instrument called the Classroom Observation Measure (COM). The COM was developed at the University of Memphis and has been validated in extensive pilot research and other studies of elementary school classroom instruction (Ross, Smith, Lohr, et al., 1991, 1994).

The COM was developed based on a review of observation instruments used in previous studies and includes both interval coding, obtained through systematic and relatively objective data recording, and holistic ratings and descriptions that reflect more global, subjective impressions of the classroom activities observed (Ross, Smith, Lohr, et al., 1991, 1994). A detailed manual describing the observation procedures and operationally defined categories accompanies the COM, and all observers for the Core Knowledge National Evaluation received training in how to use the COM.

The COM consists of the following parts:

Parts I and II: Classroom Makeup and Physical Environment. This section is used to record demographic information about the classroom (class size, racial and gender composition, teachers and aides), seating arrangements, and classroom resources.

Part III: Interval Coding. This section is used to record observations from nine 1-minute segments coded at 5-minute intervals in the areas of (a) subject(s) taught, (b) teacher orientation

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[2] We found that the whole school day observations did not allow us to see a broad range of implementation levels and classrooms events. Therefore, in Year 2, upon reflection and data analysis, we made the decision to move to one-hour observations across each grade level.

(e.g., teacher-led, small group), (c) teacher behaviors (e.g., lecture, facilitate discussion), and (d) student behaviors (e.g., listening, reading). The interval coding section also includes measures of time-on-task and academic engagement.

Part IV: Overall Observation. This section is used to record the extent to which different teaching and learning approaches (e.g., cooperative learning, direct instruction, seatwork, use of computers) were used during the overall observation. In order to customize the COM for use in this study, we also asked the observer to rate the extent to which there was evidence of Core Knowledge content in the observed lesson.

Part V: Comments. This section provides space for the observer to record field notes and comments on the observed classroom events.

Due to the extensiveness of data collection and analyses, only major results from the COM analysis are presented in this report with an emphasis on identifying issues that are most salient to Core Knowledge.

Teacher Surveys. We surveyed teachers in Grades 1-5 in all 12 Core Knowledge schools in May, 1997 to gain a more broad overview of implementation issues and to assess the level of implementation of Core Knowledge across the schools. In May, 1998, we again surveyed teachers in all schools, but only those in Grades 3 and 5, as these were the grade cohorts we followed during the third year of our study. We also felt that surveying two grade levels would give us a representative picture of implementation across the school without burdening all teachers with the duty of completing questionnaires.

The questionnaire was divided into two parts. The first part of the questionnaire asked teachers a range of questions related to Core Knowledge implementation, including questions about the resources that have aided them in the implementation of Core Knowledge, the instructional methods used in their classrooms, and the time they spend teaching Core Knowledge. Most questions allowed teachers to respond with a choice of answers; a few were open-ended.

In the second part of the questionnaire, we included a list of each topic in the Core Knowledge Sequence by grade level. Teachers were asked to indicate whether they had taught or planned to teach particular Core Knowledge topics during the school year. The survey did not ask teachers to report the depth in which they covered particular topics.

The questionnaires provided name anonymity; however, teachers were identified by school and by grade level. In 1997, surveys were mailed to teachers, and they were asked to return the surveys by mail. Forty-six percent of teachers in advanced implementation sites and 39% in new implementation sites returned the survey. In 1998, in order to achieve a greater return rate, we hand-delivered surveys to teachers during our site visits to the schools. In many cases, we were able to pick up completed surveys during our visits. However, some teachers mailed their completed surveys to us. Overall, the return rates were much improved: 78% of third and fifth grade teachers in advanced implementation sites returned completed surveys; 91% of third and fifth grade teachers in new implementation sites returned surveys.

Qualitative Data Synthesis. We triangulated data from interviews, classroom observations, teacher surveys, and school documents in order to help establish reliability of our study findings. Qualitative data analysis was ongoing throughout the three years of the study, and involved coding data and developing within- and cross-case data reports and matrices in an effort to identify patterns and key issues within and across sites (Miles & Huberman, 1994). In sum, this final report relies on a synthesis of findings from a diverse set of qualitative (and quantitative) data sources.

B. Quantitative Component

The quantitative component of this evaluation examined (a) experimental-control differences in achievement gains over three years, (b) the relationships between level of implementation (determined through three-year case studies) and academic gains, and (c) differences in gain by cohort (one cohort was followed from first through third grade at each school, and a second cohort was followed from third through fifth grade). The primary method that we used in the quantitative evaluation was a quasi-experimental design, which compared four Core Knowledge schools to four matched comparison schools. Only students for whom both pre- and post-testing data are available were included in any "gain over time" analyses.

Two subtests (Reading Comprehension and Math Concepts and Applications) of the Comprehensive Test of Basic Skills, Fourth Edition (CTBS/4) were administered to first and third graders in all Core schools and comparison schools at the beginning of Year 1 of the study as pretests. In sites that conducted their own CTBS or other comparable testing (e.g., CAT, ITBS), we accepted locally gathered norm-referenced data. We also gathered archival data from all of the schools regarding attendance and school-level demographics.

We gathered two types of outcome data on both the first-through-third-grade and third-through-fifth-grade cohorts in the 16 schools. First, we re-administered the CTBS subtests to all third grade students in the 16 schools (again, with the exception of schools already administering comparable tests) at the end of Year 1 (1996), and to all third and fifth grade students at the end of Year 3 of the study (1998).

Second, in collaboration with the Core Knowledge Foundation, we developed third and fifth grade tests of Core Knowledge, which include Language Arts, Social Studies, and Science subtests derived from content in the *Core Knowledge Sequence: Content Guidelines for Grades K-6 (1995)*. The initial third grade test, of 45 minutes duration, was administered in all 16 schools in this study in the spring of 1996. We again administered the third grade test and the fifth grade test to all third and fifth graders in the third year of the evaluation (May, 1998).

A more detailed description of the gathering and analysis of achievement data is provided in Section IV.C.

III. CROSS-CASE ANALYSIS OF CORE KNOWLEDGE SEQUENCE IMPLEMENTATION

A. A Longitudinal Look at Core Knowledge Implementation

A new curriculum or other reform can only impact students if it is implemented. Research from the Sustaining Effects Study (Berman & McLaughlin, 1977; 1979), Disseminating Efforts Supporting School Improvement (DESSI) (Crandall et al., 1982), and Special Strategies (Stringfield et al., 1997) have all concluded that level of implementation is a significant predictor of student achievement gain. This gain is over and above any general positive effect of participation in a particular program.

Therefore, questions as to the levels of implementation achieved in this study's 12 schools and factors affecting those levels of implementation are considered before examining evidence of effects. In this report, analyses of implementation are presented in the following order: (a) teachers' reports of the level of Core Knowledge content coverage; (b) classroom observations of level of implementation; (c) a cross-case analysis of the forces that shape the implementation of Core Knowledge; and (d) a list of components for successful Core Knowledge implementation. In Section V of this report, we provide individual case studies of implementation, coupled with data on student outcomes at each school.

We began this study in the fall of 1995 with a list of six schools identified as *new,* promising implementation sites, and six *advanced* implementation sites. Of the six schools identified as *new* or *promising,* four had implemented Core Knowledge for one year by the time our study began in the fall of 1995, one had not yet begun implementation, and one had been implementing Core in a very limited fashion for two to three years. Of the six schools identified as *advanced* implementation sites, three schools were in their third year of implementation when our study began, one school was in its second year, and two schools had been implementing Core for four or more years.

At the end of three years (Spring, 1998), all 12 schools were still implementing the Core Knowledge Sequence. Core implementation improved and increased dramatically in four of the six new sites over the three years. In fact, some of these sites reached implementation levels that were consistent with, if not superior to, some of the advanced sites. Implementation also improved or remained at consistent high levels in five of the six advanced implementation sites. Core Knowledge implementation waned over time considerably in one of the original advanced sites and one of the original promising sites, leading us to conclude that while all 12 schools reported that they were implementing Core Knowledge, 10 schools were authentically doing so.

These assessments of overall implementation level are based on data collected in interviews with teachers, administrators, and students; classroom and school observations; and teacher survey data on content coverage. In the following sections, we present findings from these various data sources.

B. Teacher Reports on Level of Core Knowledge Content Coverage

Teacher survey data is rather revealing of content coverage differences across sites. Table 2 shows a comparison of content coverage rates between teachers in new and advanced Core Knowledge sites.

Table 2: Core Knowledge Content coverage as reported by teachers: Comparison of new and advanced implementation sites in 1997-98

Topic Category	Third Grade		Fifth Grade	
	New CK Schools	Advanced CK Schools	New CK Schools	Advanced CK Schools
Poems	49%	64%	44%	62%
Sayings/Phrases	75%	94%	81%	91%
Language Arts	95%	91%	78%	95%
Stories	57%	66%	38%	68%
Mythology	47%	68%	n/a	n/a
Literature	n/a	n/a	77%	88%
Geography	52%	77%	74%	90%
World Civilization	66%	84%	50%	66%
American Civilization	71%	91%	62%	85%
Science	73%	85%	72%	80%
Math	94%	92%	89%	92%
Mean percentages	68%	81%	67%	82%

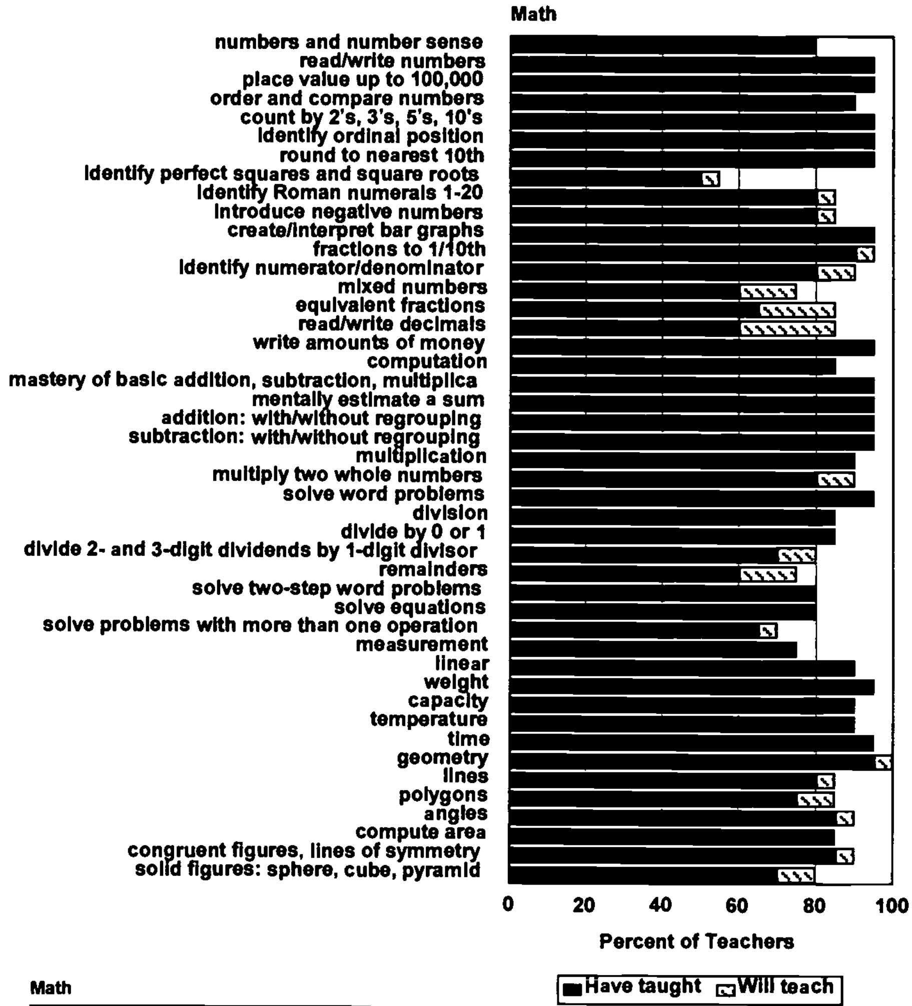
In 1998, in both Grades 3 and 5, teachers in new sites reported covering less content (a difference of 12-16% overall) than their advanced implementation site counterparts. The greatest differences between the sites appeared in the coverage of fifth grade stories, third grade mythology, and fifth grade American civilization. The smallest differences in content coverage were in third grade language arts and math. Within each type of site (new vs. advanced), content coverage was remarkably consistent across grade levels.

Figure 1 shows the specific coverage of math topics as reported by third grade teachers in new implementation sites during the 1997-98 school year.

Figure 1 shows that third grade teachers in *advanced* sites reported covering or planning to cover 92% of Core Knowledge topics in math. This is roughly consistent with the math content coverage (94%) reported by third grade teachers in *new* sites. See Figure 2.

While third grade math is an example of a topic area in which there was consistency between the new and advanced sites, we found rather stark differences in content coverage of American Civilization topics among fifth grade teachers in advanced and new sites. Figure 3 shows the specific coverage of American Civilization topics by teachers in advanced implementation sites during the 1997-98 school year.

Figure 1:
Percentage of 3rd grade teachers in *advanced* implementation sites who taught or planned to teach specific Core Knowledge content in the area of Math



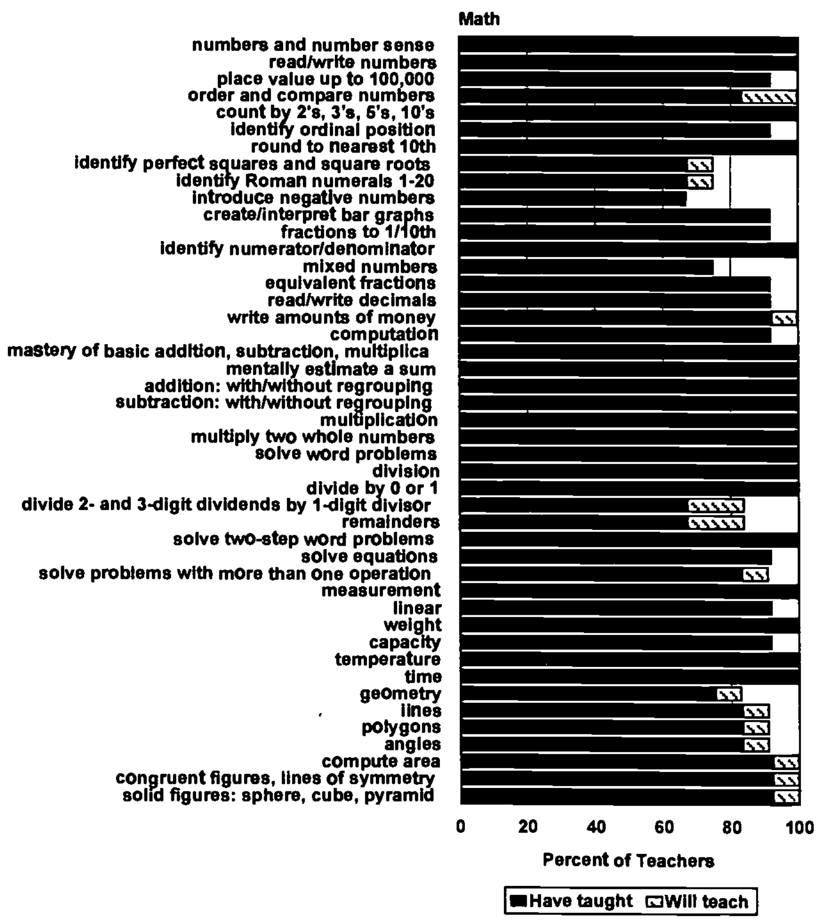
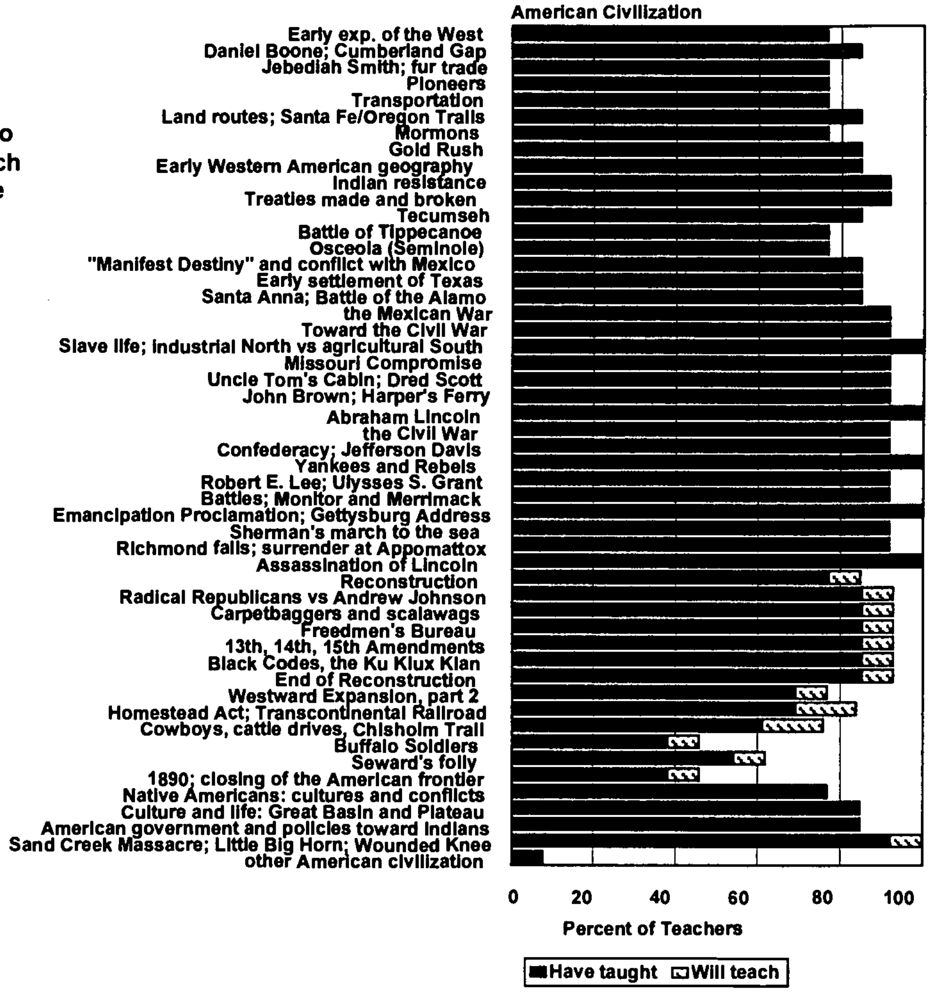


Figure 2:
Percentage of 3rd grade teachers in *new* implementation sites who taught or planned to teach specific Core Knowledge content in the area of Math.

Figure 3:
Percentage of 5th grade teachers in *advanced* implementation sites who taught or planned to teach specific Core Knowledge content in the area of *American Civilization.*



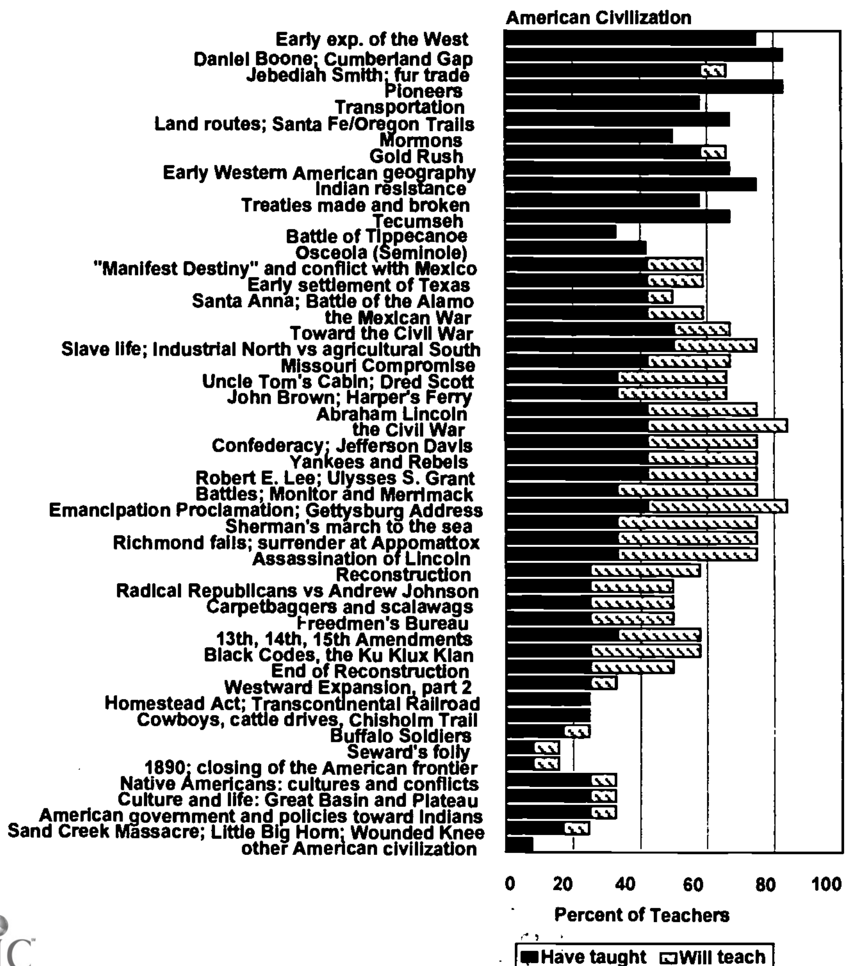


Figure 4:
Percentage of 5th grade teachers in new implementation sites who taught or planned to teach specific Core Knowledge content in the area of American Civilization.

Figure 3 shows that fifth grade teachers in *advanced* sites covered or planned to cover 85% of the Core Knowledge content in American Civilization. In contrast, Figure 4 shows that fifth grade teachers in *new* sites covered or planned to cover 62% of the content in American Civilization.

As these figures show, the consistency of content coverage in advanced vs. new sites varied according to subject area and grade level. Section V provides overall content coverage data by school. The following section provides classroom observation data on implementation.

C. Classroom Observation Data on Implementation

We analyzed the observer ratings across and within schools to assess Core Knowledge implementation. We observed each third and fifth grade classroom at least twice during the 1997-98 school year for an hour at a time. We have reasonable confidence that these findings represent a fairly accurate measure of implementation, as most teachers did not know in advance when we would be observing their classrooms. Figure 5 reports data on the percentage of classrooms in each school with some or extensive evidence of Core Knowledge being taught.

Figure 5 shows that there is considerable variation both between new and advanced implementation sites, as well as within each group. An average of 59% of classrooms in new implementation sites and 75% of classrooms observed in advanced implementation sites showed evidence of Core Knowledge during our unannounced observations. These numbers are remarkably consistent with the percentages of content coverage reported by the teachers presented in Table 2.

With the exception of Garvey and Colonial, all of the sites showed evidence of Core Knowledge in at least 50% of the classroom observations. An extensive discussion of the factors that led to diverse levels of implementation in the each of the school sites is provided in Section V.

Finally, we conducted a descriptive analysis of the teaching and learning approaches observed in Core Knowledge classrooms. Figure 6 shows the percentage of classrooms across schools where particular instructional strategies were observed.

Figure 6 shows that independent work by students was the most prevalent instructional strategy observed. We can infer that much of this independent work was skill-oriented, as sustained writing/composition (either self-selected or teacher generated topics) was observed in only 29% of classrooms. Direct instruction of material to the entire class was also commonly observed. Not surprisingly, the data on the prevalence of student discussion is consistent with the data on the teacher acting as a coach or facilitator. Interdisciplinary instruction or an integration of two or more subject areas characterized almost half of the classrooms. Thirty percent of classrooms observed included some experiential, hands-on learning activities, and 44% of the classroom observations included some cooperative learning among students. Computers and other technologies (e.g., overhead or film projectors) were used as instructional tools in only one-quarter of the classrooms observed. From these results, we can conclude that most Core Knowledge classrooms are characterized by a mix of joint productive activities between teachers and students (Tharp, 1997) and more traditional methods of instruction.

Figure 5: Evidence of Core Knowledge observed in 3rd and 5th grade classrooms 1997-98

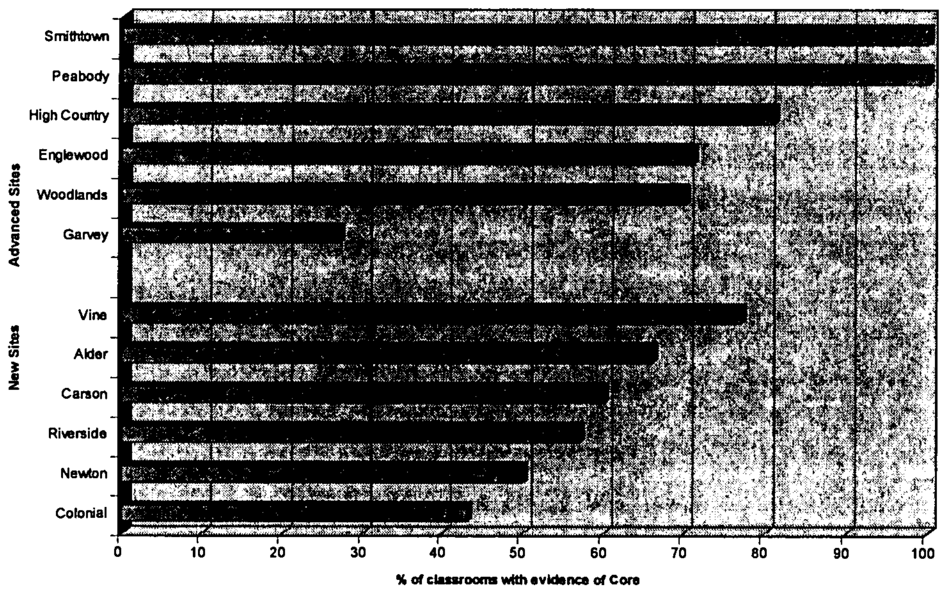
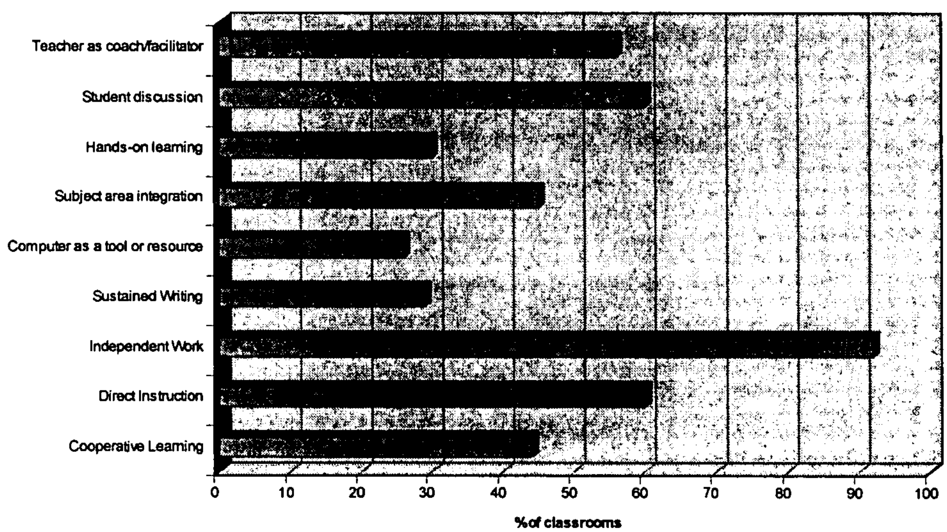


Figure 6: Instructional Strategies Observed in Core Knowledge Schools



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D. Forces that Shape the Implementation of Core Knowledge: A Cross-Case Analysis

A comparative, cross-case analysis of the Core Knowledge schools in our longitudinal study suggests that there are four major forces that shape Core Knowledge implementation:

1. The nature of the reform model itself;
2. Local context, including reasons for adopting the reform;
3. Systemic and policy conditions;
4. Capacity for change, including material and human resources.

In the following section, we consider the impact of these forces on the implementation of Core Knowledge.

The Nature of the Reform

One of the major forces that impacted the implementation of Core Knowledge in the 12 schools is the nature of the reform itself, which has specific and collectively unique characteristics.

Limited Implementation Guidelines. Unlike some other school reform groups that set forth a planned progression for which parts of the reform should be implemented each year (e.g., Accelerated Schools [Finnan et al., 1996; Levin, 1987] and Success for All [Slavin et. al, 1996b]), the Core Knowledge Foundation has historically left these decisions to local educators. Only recently has the Foundation begun to get more specific in its guidelines for implementing the Core Knowledge Sequence. When they began implementation, most of the schools in our study had available to them a guide called *A School's Guide to Core Knowledge: Ideas for Implementation* (Jones, 1991), which was published by the Core Knowledge Foundation. This concise, 13-page guide draws upon the experiences gained by educators in the first Core Knowledge school to give educators in other schools ideas for getting started with Core Knowledge. However, these were intended to be loose guidelines or suggestions, not strict rules for implementation.

The absence of a specific implementation plan led to substantial variability across the 12 schools in how they chose to implement the curriculum. One of the main areas of variance is the speed with which schools incorporate the curriculum. Several schools in the sample "jumped into full implementation the first year," as one principal described. Others chose to phase in grade by grade or parts of the curriculum one at a time (i.e., history followed by literature, etc.). For example, at Riverside, teachers experimented with teaching a number of Core Knowledge units the first year; during the following year, the principal encouraged teachers to teach the units they thought would be the most interesting. "The goal was to get them familiarized with integrated teaching," explained the principal. Gradually, over the course of two years, teachers at this school developed units during established meeting times. The principal explained: "We'd rather take our time and have some really strong units."

Another school used a grade-by-grade, phase-in implementation approach, beginning with the first and second grades in the first year, adding third grade the second year, and fourth and fifth the following year. This strategy was chosen because there was initially greater consensus for implementing the Core in the primary grades, and while the upper grades supported the school's adoption of the curriculum, the phase-in approach allowed them to "look at it, test it out, and maybe even try it in their classroom without committing to it." At another advanced site, High Country, teachers reported: "We had a year to prepare before we had to teach it. We weren't just thrown into it. We could just gather supplies, gather information, become familiar with it, and try the units we had materials for already."

Many teachers at the strongest implementation sites stated that the *lack* of specificity in implementation was one of the reform's chief positive attributes. Paradoxically, we also observed cases where the lack of a clear, time-specific implementation package resulted in substantially sub-optimal initial implementation, followed by a multi-year decline in level of implementation. When schools were under substantial pressure from districts or states to achieve one goal (e.g., higher basic skills test scores) while attempting to conduct the non-specific implementation process of Core Knowledge, the implementation of Core tended to be pushed aside. This was characteristic of the two low implementation sites, Garvey and Colonial. In these sites, perhaps a more specified implementation plan for Core Knowledge would have been more effective in getting the curriculum institutionalized.

A second area of variance, which is related to the lack of specificity for implementation provided by the Core Knowledge Foundation, is the time spent teaching Core Knowledge. The Core Knowledge Foundation suggests that Core Knowledge material comprise "about half of any school's curriculum, thus leaving ample room for skills instruction and local requirements and emphases" (Core Knowledge Foundation, 1995, p. 4). In our interviews with teachers, we asked them how much time was spent teaching Core Knowledge. Overwhelmingly, teachers at the advanced implementation sites stated that they spent more than 50% of their time teaching Core material. Estimates were generally in the 60% range, with some as much as 75%. These higher estimates were generally the result of teachers' integrating Core content into their other, more traditional skills instruction time. This percent-of-time dimension varied by teacher, school, and year, with the schools experiencing the greatest pressure to raise test scores also characterized by substantial declines in Core Knowledge time. It is important to note that teachers also varied widely in how much time they give to a particular *topic* or unit. Some chose to simply expose children to the material whereas others chose to pursue particular topics in depth.

Conversely, teachers at most of the new implementation sites had lower estimates of the amount of time they spent teaching Core Knowledge, generally less than 50%. A teacher at one new site with a slow phase-in approach stated: "I call Core Knowledge the icing on the cake... And the children love it because there is no pressure." She added: "Each year I'm adding more. I started very slowly." Another teacher explained that it comprised about a quarter of what she teaches. She explained that teaching reading was her top priority.

Finally, because the Core Knowledge Foundation, unlike many other school reform groups (e.g., the Comer School Development Program [Comer & Haynes, 1996]), does not give specific guidelines on how schools should restructure, Core Knowledge schools made organizational changes that made sense to them within their local context. For example, one of the advanced implementation sites recently reorganized their fifth grade so that instead of students switching teachers for each academic subject, they now have only two teachers — one for math and science and one for language arts and social studies. The principal explained the rationale behind this change: "Core Knowledge really involves a great deal of hands-on activities. We felt that by saying it's time to stop, we have to move to our next subject. We really were putting up a barrier for the kids who wanted to continue. And many of the activities that we do with Core Knowledge take longer than just a forty-five minute class time."

The absence of a concrete implementation plan for Core Knowledge appeared to hold both advantages and disadvantages. Clearly, it allowed for local variation in organization and implementation strategies, and, in diverse contexts, unique strategies appeared to be succeeding. Still, there were schools in which a more concrete plan with well-described steps (perhaps laid out by the school staff or administration in coordination with consultants from the Core Knowledge Foundation) might have led to a higher level of implementation.

Beginning in 1996, when Connie Jones, the principal of the first Core Knowledge school, joined the Core Knowledge Foundation staff as Vice-President and Director of School Programs, the Foundation began to expand its implementation guidelines. Workshops are now offered to assist schools in planning for Core Knowledge implementation. Still, even as of December, 1998, the only thing that new Core Knowledge schools must commit to doing is teaching all of the Core topics at the grade levels specified by the end of the third year of implementation. The speed at which schools phase in the curriculum is entirely up to the individual schools, as is the specific amount of time spent on Core Knowledge topics.

No Pre-packaged Materials for Teachers and Students. A second way in which Core Knowledge differs from some other externally developed school reform models is with regard to materials provided for students and teachers. Schools have available to them the *Core Knowledge Content Guidelines for Grades K-6* (Core Knowledge Foundation, 1995), which includes a listing of the topics to be taught, the *What Your [K-6] Grader Needs to Know* books (e.g., Hirsch, 1993), which are intended mainly for parents, and *Books to Build On* (Holdren & Hirsch, 1996). This last resource, an annotated bibliography of Core Knowledge source material for educators, was not available when the study began.[3] The Core Knowledge Foundation does not directly specify the books, materials, or lesson plans teachers should use to teach Core Knowledge (though *Books to Build On* gives suggestions of resources), nor does it give guidance as to pedagogical strategies. There is no Core Knowledge teacher manual, nor are there textbooks or other materials for children. However, teachers share lesson plans at the annual

[3] Nearly two years after it was published, many of the teachers we surveyed in the spring of 1998 had not heard of it.

conference and some plans (developed by teachers in Core schools) are posted on the World Wide Web.

Our survey showed that the majority of teachers were provided with a copy of *What Your [X] Grader Needs to Know* during the past three years and copies of the *Core Knowledge Sequence: Content Guidelines for Grades K-6*. However, the absence of prescribed materials and guidance for instruction resulted in a great diversity of instructional strategies used by teachers across the sites (see Figure 6). In the survey, we asked teachers to rank the three instructional techniques they use most often. The three techniques used most often by teachers in the 12 schools included teacher-made materials, thematic units, and trade books. Most schools reported changing their instructional strategies with the introduction of Core Knowledge. For some, this meant "more project teaching, more hands-on, build-it, create-it types of teaching, and less dependence on textbooks than ever," as one educator described. Similarly, a principal at another school explained: "With adopting Core Knowledge, which has a lot of content that you won't find in the basal reading series, we went to a children's literature, whole-language approach to teaching reading and writing."

An educator at Englewood concurred, explaining that they had integrated whole language and a "Multiple Intelligences, varied learning styles approach" when they implemented Core Knowledge. At this school, Core was seen as vehicle for thematically blending subjects across the curriculum. By contrast, another school in our sample, Newton, favored a more fundamental, back-to-basics approach that included phonics and a direct instruction, traditional, whole-group delivery system. Two schools used the *What Your [X] Grader Needs to Know* books in the classroom. As one principal explained in an interview: "We bought *What Your [X] Grader Needs to Know* just as a class set. We called it our reference guide. 'Take your Core Knowledge reference guide, and turn to the kingdoms of ancient Africa, and let's find out about kingdoms of Chad,' and so forth."

We heard varied responses from teachers and principals as to whether or not they would prefer to have prescribed materials or lesson plans for Core Knowledge. Particularly in the advanced implementation sites, all of which had been implementing Core Knowledge for at least four years, we found that the majority of educators spoke positively about the absence of materials. As one principal stated:

> I would hate to see us formalize [Core Knowledge] to a point that it's almost a textbook approach. Because once we start having a Core Knowledge textbook, then Core Knowledge is going to be just like everything else. It's not going to be a real change process; it's just going be another series you adopt.

Some teachers also agreed that prescribed lesson plans and materials for Core Knowledge would reduce the possibility of positive collaborative relationships among teachers that were created through joint planning. Many teachers also enjoyed conducting the research and developing their own lesson plans that fit with their style of teaching. A teacher at an advanced implementation site explained: "I think when you get into *how* to teach, that's when you meet resistance.... When you bring in a new package that says 'this is the stuff we want you to teach and this is how to teach it,' I think a wall comes up immediately." Another teacher reiterated: "I really appreciate the fact that the foundation deemed classroom teachers educated enough to handle it." Some teachers disagreed. One teacher explained: "I think the Core Foundation would be doing a great service if they looked seriously at the skills that go along with content.... I think the scope and sequence should be set.... I think assessment should be added as well."

In addition, because of the absence of prescribed materials and lesson plans for Core Knowledge, many teachers reported spending remarkable amounts of time planning lessons and gathering materials, particularly in the first one-to-two years of implementation. As one teacher described: "That first year, [at home] I'd get the kids to bed... and I'd be sitting with the encyclopedia researching the colonies." Although most teachers stated that the time commitment and level of work required for preparation lessened over time, especially after the first two years, the considerable and even burdensome amount of time required by teachers in planning constituted a hindrance to implementation in some schools. In addition, almost every teacher we interviewed expressed difficulty in finding age-appropriate materials for various units. For example, teachers had trouble finding materials for first graders on the U.S. Westward Expansion.

More recently, as of December 1998, the Core Knowledge Foundation has begun to provide teachers with copies of sample lesson plans, in addition to copies of the Core Knowledge Sequence, when schools participate in Core Knowledge Professional Development workshops. However, these lessons are intended to serve simply as examples. In addition, the Baltimore Curriculum Project, a non-profit organization that is working with schools in Baltimore implementing both the SRA Direct Instruction Program and Core Knowledge, has developed Core Knowledge lesson plans, which are available for purchase.

Limited Professional Development. Some externally developed reforms (e.g., Success for All [Slavin et al., 1996a], the New American Schools Designs [see Stringfield, Ross, & Smith, 1996; Smith et al., 1998]) require structured professional development for teachers. By contrast, Core Knowledge historically (before August, 1996) neither required nor offered professional development. At most, the schools in our sample received short overview presentations from Core Knowledge Foundation staff, and this occurred only in a couple of cases.[4]

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[4] More recently, the Foundation has substantially increased its professional development offerings. However, none of the workshops are required, unless schools contract with the Foundation as part of their federal Comprehensive School Reform Demonstration Program grant applications. In these cases, the Core Knowledge Foundation requires a formal application process which includes a letter of commitment stating how buy-in of 80% of the staff was obtained. Schools must also submit a school-wide planning document that includes a year-long plan for teaching Core and state and district standards, and schools must submit sample lesson plans. They must also participate in all training workshops and spend a minimum of $200 per teacher on Core Knowledge-related resource materials.

As for ongoing professional development, educators from around the country gather at the Core Knowledge National Conference once a year, local funding permitting. The schools in our sample all participated in the conference to one degree or another. Overwhelmingly, teachers had extremely positive reactions to the annual conference, which began in 1991 with about 100 attendants and has grown to include over 2000 attendants. "Our best times together are those conferences," stated one teacher. A major benefit of attending Core Knowledge conferences was the opportunity to learn about how teachers in other Core Knowledge schools teach Core topics and sometimes to make lasting connections with them. This was especially useful for teachers in schools in remote areas. A teacher at an advanced implementation site stated: "I have made some really good friends at the conferences throughout the years. We see each other and we trade things back and forth." In addition to the annual conference, current information about developments with Core Knowledge is shared with all Core schools through a quarterly newsletter, which less than a third of the teachers reported receiving. However, apart from these efforts, no formal *ongoing* professional development for Core Knowledge has historically been provided by the Foundation.[5]

The effect of the limited staff development provided by Core Knowledge to the schools in our sample has been that some of the schools provided their teachers with no staff development related to Core, while others were much more proactive. For example, the principal at Riverside arranged staff development sessions during which experts from the local colleges and high schools addressed the topic areas that the teachers found most daunting. She explained: "We got waived from district staff development, and we set up content seminars.... Physics and world history were the biggest areas." These seminars drew interest from teachers from other schools. A teacher at Smithtown explained their school's unique strategy for staff development:

> As new people come in, [the superintendent] asks them to read the first Hirsch book, *Cultural Literacy*.... I know we were able to get some [college] credit for it, because we spent quite a few evenings working on it in a book-group type atmosphere. And right now, [the superintendent] is doing another course on unit writing so that we can write up some of the Core Knowledge units [and get college credit.]

As of December 1998, there were a total of 132 Core Knowledge trainers who work with schools around the country. The trainers, who work essentially as consultants, are experienced, specially trained teachers and administrators from Core Knowledg schools who serve as workshop leaders. A series of four workshops are offered to interested schools. The first workshop is a half-day Core Knowledge Overview, which involves a presentation of the program. The second workshop is a 1 ½-2 day "Getting Started" session that includes training on developing a school-wide plan for implementation. The third 1-2 day workshop provides training on developing lesson plans, and the fifth 3-5 day workshop provides guidance for teachers in developing Core Knowledge Units. The Foundation will also help facilitate Core Knowledge school visits for interested educators.

[5] This has begun to change, as two Core Knowledge regional training centers in St. Paul, Minnesota and San Antonio, Texas opened in 1998. These training centers, which grew up in reaction to a growing number of schools adopting the program in these regions, provide early implementation training on-site (i.e., the workshops described above), as well as ongoing support to local sites (e.g., seminars on Core topics). Four additional regional training centers are currently in development. In addition, there are coalitions of Core Knowledge schools in various states that organize local meetings for teachers to get together and share ideas, but these are not organized by the Foundation.

The upside of locally developed professional development efforts is that schools or districts were able to craft activities that directly meet their teachers' needs. The downside is that some schools or districts chose to provide teachers with no staff development related to Core and offered very limited opportunities for attending the annual conference. This resulted in some teachers feeling well supported, prepared for teaching Core Knowledge, and participating in local and national networks, and others not.[6]

Local Context

Some of the major forces shaping the implementation of Core Knowledge derive from local contextual factors. The impetus for reform, the population served, and local community politics all seem to play important roles in schools' initial success in implementing Core and how their implementation is shaped to suit their changing local circumstances over time. Each of these forces is discussed below.

Impetus for Core Knowledge. The schools in the study sample had a myriad of reasons for initially adopting the Core Knowledge Sequence. Educators' comments ranged from "we didn't like the fact that we were all doing our own thing and that there was no continuity for children" to "we were looking for a reform that was not a passing fad" to "the parents wanted a literature-based sequential curriculum" to "there was grant money available to us if we were willing to try it." Clearly, the impetus for adopting Core Knowledge came from a number of different places: administrators at the school and district levels, parents, and local foundations. While these motivations varied, there were in fact clear patterns regarding choice and implementation.

The first pattern apparent was that none of the educators mentioned the specific Core Knowledge content as a motivating factor. Rather, educators were seeking a sequential, content-rich curriculum. The Core Knowledge Sequence met this demand, and in fact, there were no other comparable, specified curricula for schools to consider as alternatives. Most educators discussed the fact that their state or local curricular guidelines were too general to produce the uniformity and coherence across the school that they were striving for.

Secondly, in none of the schools did the impetus for teaching Core Knowledge arise from among the teachers. However, those schools where educators either participated in choosing the reform or later became teachers at the school knowing Core Knowledge was a feature experienced much greater success in implementation than those who felt Core Knowledge was implemented against their will. As a veteran teacher explained:

[6] This scenario is likely to change, with the professional development opportunities now offered by the Foundation to new Core schools.

> Most of us are resistant to change. We could see what kind of work it was going to be. It was kind of threatening because there would be no textbook. You had to go out and get your own materials. We were used to opening up a manual and it telling us exactly what to do. But after we saw content, and after we got past the fear factor, then the ones that got into it really quickly helped to sway the others. Now, I would say 90% of the teachers are really happy with it.

Studies of diverse reforms (e.g., Datnow, 1998; Datnow & Stringfield, 1997; Stringfield et al., 1997) typically report at least moderate levels of resistance to reform efforts. What appears to make Core Knowledge different from some other reform efforts is that there appears to be less teacher resistance overall, particularly as teachers begin to implement the program. This may be because teachers are generally more resistant to changes in instructional approaches ("the how") than changes in curriculum ("the what"). We were consistently surprised at the degree to which teachers uncritically accepted the content of the Core curriculum.

Population and Community Context. Schools tended to tailor the teaching of Core Knowledge to their local student population and community, resulting in variations across sites. Thus, while the content *as listed* in the Core Knowledge Sequence was the same for each school, the content *as delivered* differed from school to school. Teachers at the 12 Core schools emphasized facts and topics that they believed would be of greatest interest to their student population, as well as those that they personally felt were important. For example, the first grade teachers at Englewood, a school with a large Hispanic population, stated that they place special emphasis on the unit on Aztecs, Incas, and Mayas, and on Mexico. A teacher explained: "That's part of their culture and heritage." At another site, teachers have integrated content about the city in which their school is located into the curriculum. This integration took place as the teachers were developing their scope and sequence during the summer before the implementation of Core Knowledge began. Teachers in bilingual classrooms have also attempted to make adaptations for their Spanish-only speakers; however, finding age-appropriate, Spanish language materials was often challenging for them. These findings suggest that a "meaningful explanatory context" for Core Knowledge content may in fact be influenced by a child's interest, cultural background, race, or gender (Feinberg, 1997), as well as teachers' own preferences.

Political Forces. Politics in and around schools affect how schools manage reform (Noblit, Berry, & Demsey, 1991). Core Knowledge is no exception. Because the reform began with an unusual political background, the politics surrounding the reform in some schools are more exaggerated than they might otherwise be. Some schools that saw themselves as progressive and embracing of diversity faced public criticism from community groups outside the school that had misconceptions about Core Knowledge based on the criticisms of *Cultural Literacy*. A teacher who frequently engages students in project-based learning explained: "Teachers [from another district school] who don't like it are thinking that it's the way that they were taught: skill and drill. But they haven't taken the time to really come and visit us and see what it looks like." Teachers in another Core school faced similar criticism from other teachers in the community who thought that Core focused solely on white, middle class concerns. Core

Knowledge schools have indeed taken on political associations in some communities. For example, Newton, a charter school, was started by what the principal described as "a group of parents from very conservative backgrounds." In this community, Core Knowledge is associated with "traditional" values, whereas in the others described above, it does not have such associations.

Several schools in our study reported holding "open houses" to which all members of the community were invited. During these open houses, schools typically displayed student projects and artwork related to Core Knowledge. In this way, they sought to create greater awareness about the Core curriculum.

Political issues have also arisen within Core Knowledge schools. For example, at Peabody, an alternative school of choice that was originally founded by parents, there was a movement among some parents to turn the school into a charter school. The amount of Core Knowledge that was to be taught became an issue in this debate. The charter advocates, seeking greater control over school governance, claimed that not enough Core Knowledge was being taught. They asked teachers to hang laminated checklists of what they had covered on their classroom doors. Teachers had in fact covered all of the topics in the Core guidelines.

Systemic and Policy Conditions

In addition to local contextual factors, we found several systemic and policy conditions that shape the implementation of Core Knowledge. These forces include site-based management policies, the level of district support, external demands for accountability, and other district and state programs. A common theme among these forces is a delicate balance between coordinated, systemic support and what schools might perceive as unhelpful pressure from the state and district levels.

Site-Based Management. Many districts around the country have implemented school-based management plans, guided by the belief that local school autonomy will lead to increased innovation and reform. In this study, we found that decision-making autonomy assisted in Core Knowledge implementation. At one school, site-based decision management allowed the faculty to ward off a district-mandated program that might have competed with Core. The curriculum coordinator explained: "The beauty of it is that the district could have told us 'you're going to do it,' but they know that it's up to us."

The three newly opened schools in our sample benefitted from freedom to decide how to allocate funding. Principals were able to use funds to equip the schools with Core Knowledge content materials, greatly aiding in the provision of necessary resources. One of these schools, Peabody, is part of its district, yet has a very high level of site-based autonomy. A parent explained: "We get to hire the teachers, and we do get to choose our curriculum. And we have been able to waive some of the district programs that haven't fit into the Core Knowledge package." The same was true at High Country, as well as Newton, the Core Knowledge charter school.

Studies of efforts to improve students' schooling through simple shifts to site-based management without the provision of alternative uses of this new management freedom have resulted in no net academic improvements for students (Murphy & Beck, 1995). However, coupled with a solid reform program, the relationship of site-based management to school improvement may prove stronger.

District Office Support. Another systemic force that shaped implementation of Core Knowledge was the level of district support that was provided to schools. Across the 12 schools, levels of district support ranged from "none" to "extensive." We found that district support positively impacted Core implementation, though the lack thereof did not necessarily negatively impact implementation — as long as the district did not get in the way of Core Knowledge. However, in some sites, the absence of support was sorely noted. For example, a teacher described her district: "Like all regulatory bodies, they want all kinds of change and innovation, and as long as the individual school is willing to bear the cost, they're all for it." She was insulted by the fact that the school board and district did not recognize her school's achievements and did not look further into Core Knowledge. Another principal also wished Core Knowledge had district support: "You could do so much more because then you can order books that are more tied in with Core materials.... You're all working for one purpose."

In fact, this type of support has occurred in the district of one of the newly implementing sites, Vine. Because the superintendent strongly supported Core Knowledge, all of the schools in the district were required to adopt it. This allowed teachers at different schools to share the work of developing units. A teacher explained: "Last year we were starting from scratch and we had to develop whole units. We were totally overwhelmed. Now this year, since it is countywide, we've divided up the units. Different schools took a topic and really did the units very nicely." (However, two years later, the superintendent left the district and district support for Core had decreased.)

Another newly implementing site also was characterized by a strong amount of district support. Not only did the district provide financial support in the form of start-up and conference travel funds, but the superintendent took an interest in learning about Core Knowledge. The principal explained: "When we first started gathering the teachers together and sharing what Core is, he came to every one of those meetings. He didn't say anything, but he didn't have to. Just his presence spoke support."

External Standards and Accountability. Demands from the state and district levels related to standards and accountability — or more specifically, standardized tests — have constrained Core Knowledge implementation in most of the sites. The impact of external standards and accountability appeared to reach a new high in 1997-98, whereas in the first year of the study (1995-96), only a few of the schools reported that external standards impacted Core implementation. Undoubtedly, this is related to the shift toward increased accountability that is increasingly characterizing educational policy making (Smith & O'Day, 1991).

Over half of the sites in the study are located in states with high stakes accountability systems. Teachers in these schools typically felt great pressure to prepare students for "the test," separate from teaching Core Knowledge. In no cases did teachers seem to feel as though the external demands for accountability enhanced their implementation of Core Knowledge. For example, as one teacher described:

> We have so many things that we have to do to meet state outcomes and guidelines.... Then we have the city, and they're telling us that we need to do this, and we need to do that. It makes it very difficult and very overwhelming.

Teachers at two sites struggled to fit Core Knowledge into their day while also doing the district-mandated performance assessment tasks designed to align the school with the district's new assessment program. Achievement on the new district tests seemed to take precedence over Core Knowledge at these schools. While performance assessment could be used as a complement to Core, the two were not yet aligned. Not surprisingly, these teachers saw Core Knowledge as something else to add to their list of things to "remember to do" in the classroom.

At several sites where Core Knowledge was well institutionalized and where high stakes accountability had not been an issue in the past, pressures were heightening. In 1997-98, some teachers and principals were concerned that less time would be spent on Core due to new state and district accountability demands. One principal explained that if students did not perform well on a new district test, "we'll have to step back and re-assess." Another administrator stated, "For our purposes, the content of those proficiency test outcomes is more important than what's in the Sequence because [that] content is being tested."

Other Reform Programs. Most of the schools in the sample were involved in a variety of other instructional and organizational changes, in addition to Core. A few of the schools were implementing Core Knowledge exclusively. Some schools found ways to strengthen the implementation by effecting changes or reforms that were in direct support of the Core. However, district mandated programs in a school hindered implementation if they competed with the Core for resources or teachers' time, or were simply disconnected from Core altogether. An experienced teacher at one site explained:

> We're implementing technology this year. That's time. That's energy. We're doing a lot of things like student-of-the-week and principal's parties, advanced workshops and this and that. And of all of those things are frosting on the cake... The frosting on the cake is taking teachers' time away from Core Knowledge.

At yet another school, a newly implementing site, a group of overwhelmed teachers stated: "I think we have almost every program known to man." Several schools in our study are located in districts that have recently mandated curricular standards. In all cases, these newly mandated curricula did not align completely with the Core Knowledge Sequence. Teachers will need to work to integrate the two curricula successfully, as the districts are holding them accountable.

Capacity for Change

Capacity for change is a major factor in the successful implementation of any school reform (Elmore, Peterson, & McCarthy, 1996). The Core Knowledge schools are no exception. We have identified several components that combine to create a school's capacity for change including fiscal resources, time, parent and community support, and teacher and principal capacity for change. What we found is that some schools had some of these capacities and not others, but that those that were having success with implementation were characterized by at least three of these capacities.

Fiscal Resources. Fiscal resources play a very important role in the implementation of Core Knowledge. "To make these programs lively and fun, you've got to put some money into it," stated one principal. While the costs of purchasing the Core Knowledge Content Guidelines and the short implementation guide are very low (under $20), the cost of purchasing materials can run quite high. We found that almost all of the schools in the sample benefited from foundation start-up grants of some amount. A principal described:

> Grant money has gone a long way in letting us buy materials and do a lot of teacher in-service. It helps pay for teachers going to the National Core Knowledge conference and visiting other schools. We've been able to talk various organizations into giving us money because of the value of the program.

Several schools acquired large grants (over $100,000) for materials, upgrading technology, and staff development. Other schools had much more modest start-up funds (ranging from $2000 to $26,000), but all benefitted from at least some money initially. This funding was seen as critical to the implementation of Core Knowledge.

The importance of extra funding in facilitating the implementation of Core Knowledge cannot be overstated. Not only do fiscal resources play a role in facilitating Core Knowledge implementation, but their absence has led to negative effects in at least one school that initially became involved in the program because a local foundation offered funding to Core schools. After two years, the foundation funding ended and, to a significant extent, so did Core Knowledge. The school did not make the transition to using its own funds, or to seeking other grant sources, to help them implement Core Knowledge more effectively.

However, in all schools, including those where start-up funds for purchasing Core Knowledge materials were provided, teachers spent a considerable amount of their own money on materials. A teacher explained that she spent $1300 of her own money when she moved from teaching fifth to first grade: "I mean that's a pretty significant chunk of my household income to buy resources." Another teacher concurred: "It's very expensive for teachers because we have to buy all the materials, and we keep hearing that we have a lot of Core money, but no, it doesn't cover that." Teachers at this school were each given $50 for the first 2 years of implementation. That teachers need to spend much of their own money to buy resources can hinder implementation, as some are understandably unwilling to do this. Schools that were more successful early implementers were able to use grant money to facilitate the purchase of resources.[7]

Time. As with most other reforms, time is a force that shapes the implementation of Core Knowledge. Because Core Knowledge is a list of topics and not a set of lessons, implementation is greatly strengthened by common planning time for teachers. Shared planning time during implementation, especially in the first several years, was critical for most teachers. As one teacher stated: "The biggest reason we've been successful is because we've been given time to plan these units." Most schools did not give teachers paid time to prepare their scope and sequence before implementation, but attempted to compensate by providing time for teachers to get together during the school week. For example, one school provided an hour per week of "team time," when students were released early and the staff worked in grade level and cross-grade level teams to share ideas and prepare and review lessons. At two other schools, the principals created common planning time by scheduling all grade level specials (e.g., art, music, P.E.) at the same time. One school shifted teachers' extra duties (e.g., lunch duty, recess duty) to administrative and paraprofessional staff. Some schools also allocated staff development days for teachers to plan units in teams. Nevertheless, there were schools where teachers had been given very little time for joint planning. Invariably, this lack of planning time negatively impacted teachers' experiences with implementing Core.

One school received waivers from the district regarding scheduling, which allowed them to better support Core Knowledge. The principal explained:

> The district waived days of school for our staff to go to the National Core Knowledge Conference. They waived the school days for us to have a [State] Core Knowledge Conference here. Not only have they not gotten in the way, but they pretty much let us do what we need to do.

In the above case, the district was more supportive than most. The majority of schools studied tended to make school level changes, and were able to do little to alter district guidelines regarding time allocation. At some sites, the school calendar was organized to accommodate Core Knowledge activities. Leadership played a key role in the reorganization of time. As one principal remarked:

> It would be a difficult thing for teachers to implement Core Knowledge without an administrator's support. Because we put the master schedule together based on their needs, we block whole days for them to do the medieval festival and the Roman holidays, and things like that.

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[7] Beginning in the fall of 1998, the federal Comprehensive School Reform Demonstration Program (discussed earlier) will likely have an impact on resources available to new Core schools.

Parent and Community Involvement. Parent and community support is an important component of local capacity for change. One advanced implementation school succeeded in gaining this support by offering parent information sessions about Core Knowledge, sending out newsletters before the first year of implementation, and continuing to inform parents about Core Knowledge as implementation progressed. At the beginning of every month, each teacher sent home an outline of the curriculum that would be covered in the following month.

At another site, parents were surveyed about their opinions of Core Knowledge before it was instituted at the school. At this site, several parent involvement initiatives were introduced in tandem with the introduction of Core Knowledge. The curriculum coordinator explained: "Our parents are a very important component of the entire curriculum. So therefore we opened our doors to parents and our parents are a big part of what has happened."

Teachers at several of the schools benefitted from parents who helped them do their research for teaching Core Knowledge units and helped them find materials. At two schools, parent volunteers served as research assistants. A teacher explained: "We have so much parent help. The parents have been doing research. One of my parents found all the poems we needed [for third grade]." When asked how it would be to teach Core Knowledge without the parents' help, one teacher at this school responded: "There is no way." Another reiterated: "It would be impossible."

However, others schools were able to utilize other community resources to increase their local capacity for change. For example, at Englewood, the adoption of the Core happened in concert with a school-university partnership, which included an intern program and professional development. The school also has partnerships with the YMCA and a local museum. These links to community institutions have in turn helped them increase parent involvement.

Teacher Capacity for Change. Teacher capacity for change is an important force in Core Knowledge implementation, as this reform ultimately lives or dies at the level of the classroom teacher. A teacher stated: "I don't believe in the adage that the curriculum is so rich and wonderful that it will fire up every student.... It depends on how it is presented. I think the teacher is a really important piece of that."

At several of the schools, teachers and principals stated that one of the factors hindering implementation was that some teachers initially lacked the background knowledge in specific content of the Core Knowledge Sequence. A principal explained: "For example, in the primary grades, the teachers had to learn world civilization along with the kids. The arts have also been a real challenge. That's been our weakest area as far as full implementation." A superintendent reiterated: "Teachers look at the curriculum and say, 'I don't know anything about this, and I don't have time to learn it,' and they brush it aside."

Professional norms of teacher collaboration are a key component of teacher capacity for change (Hargreaves, 1994). Teachers in Core Knowledge schools must be willing to work together. At two schools in the study (the lowest implementers), teachers have not worked together and implementation has been much more of a struggle. In general, teachers have found that collaborating or teaming with other teachers (typically on grade level) has facilitated successful implementation of Core Knowledge. Implementing Core has actually inspired some teachers to collaborate, even in schools where this formerly did not occur. A new teacher at one school stated: "If we didn't work together, I would be so overwhelmed, and I would feel like I would never have the right material, or enough material. It would just take so much time to do it on your own." A teacher at an advanced site explained:

> [Teaming] works really well, particularly for new schools that are starting. It enables you to concentrate on the new curriculum areas that you've never taught before. I'll take an area, and then the other two teachers will take an area. It's particularly important that first year, but we're still doing it because it's fun.

A principal explained the importance of team work, both in teaching and planning: "Core Knowledge requires people who enjoy working as a team, because it is not going to work unless there is that teamwork involved." At Woodlands, we observed the first grade teachers rotating students for the "Christmas Around the World" unit. Each teacher specialized in the holiday celebration of a different country. A teacher explained: "We each take a country and then we go to the library, and we try to get as much as we can on that country. We pick the interesting facts that the kids really like." She added: "When we did the Revolutionary War, that was new to the sequence and it was overwhelming. So one teacher took Paul Revere, one teacher took the Boston Tea Party, and so on. And then when we put it together we had a terrific unit, and nobody is burned out because they each took one little piece." Teachers reported that successful implementation was also facilitated when they were able to share lessons and experiences with teachers at other Core Knowledge schools.

Administrator Capacity for Change. In addition to teacher capacity for change, administrator capacity was also a major force in the implementation of Core Knowledge. Our survey data suggest that teachers received very strong support from principals, and that, as one teacher stated, "Principals who are instructional leaders are essential to the success of Core Knowledge." Another teacher stated: "[The principal] really plays a great big part in our level of intensity and in how much Core we teach." In schools where the principal's interest in Core Knowledge has lapsed over time, so too has the staff's interest in implementing the curriculum. A teacher explained, "If the principal's behind it, it's going to go. If he's not, it's not." In schools that have experienced satisfaction with Core Knowledge, the principals "go to bat" for Core Knowledge at the district level and in the community. These characteristics imply that not only did teachers need to make changes to incorporate Core Knowledge, but principals often needed to change their roles to effectively support the reform as well.

Summary Comments. Across the 12 sites in this national study, multilevel support for change was required for Core Knowledge to be successfully implemented. As one principal stated: "Here we have a superintendent who believes in the curriculum, a principal who believes in the curriculum, and key teachers all believing in the curriculum.... You take out any one of those things and I think it would be more difficult."

What is also notable about the schools in this study is that they possessed what Director of School Programs Connie Jones called a "pioneer spirit." Many of these schools took on Core Knowledge at a time when the curriculum was in its early stages, when there was little professional development to accompany the program, and they were able to succeed nonetheless. Not all schools have this capacity. Indeed, as Dr. Jones aptly stated, "we're now working with the settlers" — schools that may not have as high a capacity for change.

IV. OUTCOMES OF CORE KNOWLEDGE SEQUENCE IMPLEMENTATION

In this section, we discuss the outcomes associated with implementing the Core Knowledge Sequence. The first two sections discuss qualitative data on outcomes and the final two sections discuss quantitative achievement test score and attendance results associated with implementation.

A. Qualitative Outcomes

Benefits. The Core Knowledge Foundation (1998) posits that the benefits of teaching the Sequence are as follows:

For students, Core:

- Provides a broad base of knowledge and a rich vocabulary;
- Motivates students to learn and creates a strong desire to learn more;
- Provides the knowledge necessary for higher levels of learning and helps build confidence.

For the school, Core:

- Provides an academic focus and encourages consistency in instruction;
- Provides a plan for coherent, sequenced learning from grade to grade;
- Promotes a community of learners — adults and children;
- Becomes an effective tool for lesson planning and communication among teachers and with parents;
- Guides thoughtful purchases of school resources.

The qualitative data we collected in the 10 moderate-to-high implementation sites suggest that the above benefits were in fact associated with Core Knowledge implementation. (These benefits were not apparent in the two low implementing sites.) Educators in the 10 moderate-to-high implementation sites also reported a myriad of other benefits. The following is a list of benefits, some of which expand on the above list, for which there was consistent, qualitative evidence across multiple sites:

1) ***Core Knowledge creates coordination in the curriculum.*** Data gathered in this study suggest that implementing the Core Knowledge Sequence does create a noticeable coordination and coherence in the curriculum. Unlike in their previous experiences, teachers

in Core Knowledge schools report: "I know what my kids have learned, and I know what they should learn on top of that." For teachers in the upper grades, this meant that they could build on what students learned in earlier grades. Another teacher stated: "They're not learning about dinosaurs year after year." Still, as one teacher remarked: "Unless everyone is teaching the curriculum, the school will not realize its maximum benefits." This final point is important, as the coordination and coherency in the curriculum cannot be achieved through Core Knowledge unless teachers consistently teach the topics in the Sequence.

2) ***Implementing Core Knowledge improves the professional lives of teachers.*** In the late 1980s, policymakers argued that if teachers are given the opportunity to shape schools themselves, it will bring out the best in them, and "the very best from teachers will bring out the very best in their students" (Barth, 1988, p. 134). This paradigm of how to build a professional culture in schools is supported by Core Knowledge. The Core Knowledge Foundation calls on teachers to make the curriculum their own by conducting research and developing their own lesson plans. Our data show that this process often adds professionalism (and enjoyment) to teaching — something which very few externally developed reforms to date have been able to achieve. For example, a teacher of 22 years stated: "I have never felt more like a teacher than I have felt since we've been doing Core Knowledge." Another experienced teacher stated: "Without a doubt, Core Knowledge is the height of my career." Many teachers like the fact that they can put their personal mark on the curriculum. About the fact that Core is not a pre-packaged curriculum, a teacher stated: "We own the curriculum. It doesn't own us, and I like that." Another teacher stated: "I really like developing my own lesson plans.... It was like going back to graduate school the first year I was here."

   In sum, Core Knowledge was viewed very favorably by teachers and was seen as an enhancement to their professional lives. In our survey, we asked teachers to respond to the following open-ended question: "If you were asked for advice from a friend who teaches at a school considering using the Core Knowledge curriculum, what would you say?" The most common response listed by teachers was literally, "Go for it!" Overwhelmingly, teachers enthusiastically encouraged their teacher friends to implement Core Knowledge. This is a very important finding.

3) ***Implementing Core Knowledge leads to increased teacher collaboration.*** Genuine collaborative work among teachers that has a focus on curriculum and instruction is all too rare in education. Yet, it is much sought after, as it is believed to lead to improvements in teaching and learning (Hargreaves, 1995; Little, 1990). As discussed in the previous section, teachers in Core Knowledge schools consistently report that implementing Core has "promoted collegiality" and "working as a team." One teacher stated: "I see a lot more teachers sharing, working together, classrooms buddying up." Core forced many teachers to work together, as they found that doing the necessary research, finding materials, and planning lessons were overwhelming if done alone. A teacher remarked: "Before the program, teachers didn't share ideas. Now we share everything!"

4) ***Core Knowledge enriches students' classroom experiences.*** Instruction in Core Knowledge schools is noticeably characterized by more content (rather than skills) than the typical elementary school. As one teacher stated: "I have worked in a school in the same district that does not use Core and the difference is amazing. With the enrichment Core provides, students are more active, focused and have a high interest level." A teacher at one school said that classroom experiences are enriched by Core because "the curriculum is exciting, challenging, and is 'eaten up' by students." Another teacher added: "I think the kids soak it up. They love it."

   Teachers also reported that it was not just certain students who were excited by Core, but all students. As one teacher stated: "It can provide a challenge to gifted students and gets the attention of those who are sometimes difficult to motivate." Another teacher remarked: "The benefits are great for teaching those children who would normally not be exposed to such subjects at home."

5) ***Core Knowledge helps challenge traditional notions about student ability.*** Many teachers reported that they were initially skeptical that the Core Knowledge content was not developmentally appropriate for elementary school students, particularly those in the early grades. However, almost all of the teachers we interviewed found that no matter what students' starting point was — low achieving, average, or high achieving — they were able to grasp and gain from learning the Core material. As one teacher stated: "They may be six-year-olds, but they can grasp a lot more knowledge than we thought before we started this." Another stated: "It has made us aware that little folks can learn a lot more than we thought they could." These comments suggest that Core Knowledge has caused teachers to rethink their initial beliefs about what students are capable of learning. Teachers also suggested that Core Knowledge diminished the need for within-class ability grouping, as the lessons could be geared toward multiple types of activities.

6) ***Students build on what they have learned previously in Core Knowledge.*** Core Knowledge is designed so that students make steady progress as they build their knowledge from one year to the next (Core Knowledge Foundation, 1995). Teachers in schools that have been implementing the Sequence for more than three years have found that in fact students make connections to Core topics they learned in previous grades. A teacher at one school remarked: "The fourth and fifth grade teachers have told us they can't believe how much our kids know coming in." Another stated: "Students make lasting academic connections because of the integration of curriculum and spiraling structure."

7) ***Core Knowledge increases students' interest in reading.*** Teachers and principals reported that Core Knowledge has had positive effects on students' interest in reading. For example, a teacher stated that since the implementation of Core Knowledge, "students are learning to read bigger words sooner. There's an interest to read and to learn." Another teacher explained that Core Knowledge even inspired a low-achieving student to learn to read: "There was a student in my class last year who could not read and he definitely could not

write. But there was one thing in the Core that really clicked with him. It was a unit on the Egyptians, and he's collecting all this stuff on mummification and learning to read about it."

At a number of schools, educators cited the fact that students are more interested in reading non-fiction as one of the main benefits of Core Knowledge. A principal stated: "We're producing writers and readers of non-fiction. Our librarian cannot believe that these kids use the library the way that they do." A teacher explained: "In the past I never had a first grader who wanted to know more about Peru or the Aztecs."

8) ***Core Knowledge increases parent satisfaction.*** A positive outcome that was observed across all moderate-to-high implementing Core Knowledge schools was the satisfaction of parents. Echoing the comments of many, a teacher at one school stated: "The parents are thrilled, thrilled, thrilled." This appeared to be true whether the school served a very involved parent population or one that had not historically had much involvement with the school. As one teacher stated: "Our parents are elated with the results of Core." Another teacher remarked: "Enthusiastic parents report regularly how much their children are learning and applying to daily life and interactions." There was also evidence to suggest that the implementation of Core Knowledge led to increased opportunities for parent involvement in a number of sites.

Negative Outcomes. According to the teachers and principals we interviewed, teaching Core Knowledge had no obviously negative outcomes for students. However, while Core appears to add substantially to teachers' professional lives, one cautionary note clearly associated with that is that planning for teaching Core is very work intensive and often tiring for teachers. A commonly stated word of advice from teachers who responded to the survey was, "Be prepared to work hard and, in the beginning, long hours." While the long hours teachers expended on preparing for Core did not appear to lead to burnout, some teachers complained. (This is discussed in detail in the preceding sections.)

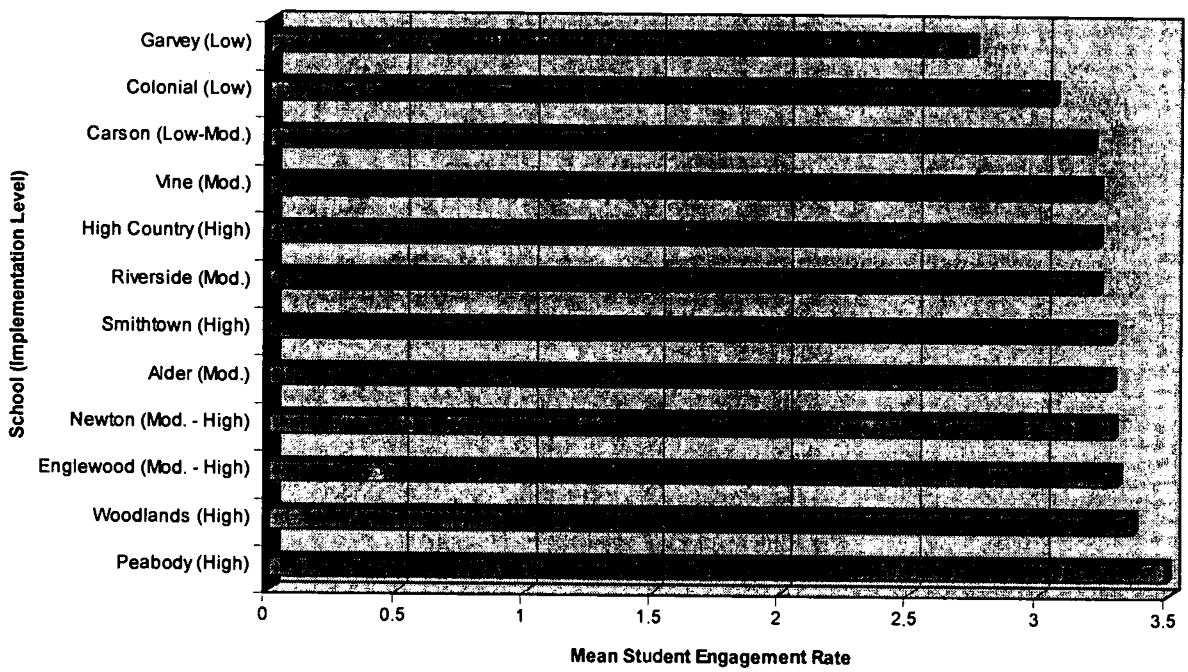
B. The Impact of Core Knowledge on Academic Engagement

The Classroom Observation Measure (COM) provides nine "snapshots" of a classroom's academic life during every one-hour observation. Two of the variables relate directly to level of student engagement. "Attention-Interest/Focus" is a measure of students' attention to classroom academic activity. "Academic Engaged Time" is "an estimation of the time out of allocated time [during a one-minute 'sweep' of the class] spent...in educationally relevant activity" (Ross & Smith, n.d., p.9). Both attention and academic engagement have repeatedly been found to be related to student achievement gains (e.g., Brophy & Good, 1986). Stallings (1980) and Brophy (1988) both note that measures of student engagement should not result in calls for 100% academic use of classroom time, but both are equally clear that an 80% or moderately higher engaged-time rate is consistently associated with higher achievement gains, and a rate lower than 80% is associated with lower mean achievement gains.

The two COM items related to student engagement are scored on a five-point scale, where 0 = "None/close to none" and 4 = "All." On each variable, an hourly mean is computed across nine observation cycles. Aggregating the scores across all observations per school yields a school mean, and averaging the two highly-related item-scores produces a more reliable school-level measure of academic engagement measures.

Given that a 100% rate is probably not possible over extended sets of observations, and not indicated by research to be necessarily desirable, researchers assumed that a school-level rating greater than 3.1 but less than 3.7 could be described as "effective use of time" on the COM. Two to three observations of each third and fifth grade classroom in the 12 Core Knowledge schools were conducted during the 1997-1998 school year, yielding a total of 12-24 COMs per school.

Figure 7: Composite Student Engagement Rates in Core Knowledge Schools



Three conclusions can be drawn from Figure 7. First, 10 of 12 Core Knowledge schools were obtaining measures of student engagement that were in what might be described as the "relatively effective" range. Studies using similar measures of engagement often find lower school-mean rates of engagement (e.g., Teddlie, Kirby, & Stringfield, 1989; Stringfield, et al., 1997).

Second, the two schools with the highest mean ratings were also schools that had been deemed "high implementing" schools through various observations and teachers' ratings of Core content coverage. Further, the two schools with the lowest student engagement ratings were the two schools rated "low" in implementation. Combined with data presented in Section V of this report, the student engagement data suggest that the low implementing schools were struggling with issues such as classroom management and student engagement that were over and above issues of Core Knowledge usage. Three years of qualitative observations in these schools suggested that the schools' lack of success in those very immediate areas might have hampered their ability to focus on demanding curricula.

Third, the data indicate that in several of the more highly implementing schools, teachers were able to effectively sustain student interest in each period's academic content. These data may suggest that students find Core content stimulating and would contradict any assertion that students were "turned off" in schools that strongly implemented Core Knowledge.

C. Achievement Outcomes

In this section, we begin by describing the analytical samples and measures used in the quantitative analyses. Next, we discuss the statistical techniques used to assess student achievement in Core Knowledge and comparison schools. The concluding section includes the results and interpretations of the quantitative analyses.

Baseline Samples

The baseline quantitative sample included two cohorts of students. One cohort of 1,011 students began the 1995-1996 school year as third-grade students, and the other cohort of 1,093 students began the 1995-1996 academic year as first-grade students.[8] The data collection staff tracked the third-grade students longitudinally at three time points: (1) the spring of the 1994-1995 school year, or the fall of the 1995-1996 school year (i.e., pretest); (2) the spring of the 1995-1996 school year; and (3) the spring of the 1997-1998 academic year (i.e., posttest). We refer to this group of students as the third-through-fifth-grade cohort. The research team tracked the first-grade students across the first and third time points, and we refer to this group as first-through-third-grade cohort.

Students from the two cohorts were sampled from 16 schools participating in the Core Knowledge evaluation. The primary method used in this evaluation was a quasi-experimental design (Cook & Campbell, 1979), which compared Core Knowledge schools to matched control schools. Therefore, we focus most attention on four advanced Core Knowledge schools and four

[8] These are baseline sample sizes. Longitudinal samples included only those students who remained at a Core Knowledge or control school for the duration of the study and who completed a pretest and posttest. The final, longitudinal samples, which were used in all statistical analyses, are discussed in the following sections on the longitudinal samples and achievement measures.

matched comparison schools located in four states: Texas, Maryland, Florida, and Washington. To control for potential contextual effects, we selected each comparison school from the same district in which the experimental Core Knowledge school was situated. Each of the four Core Knowledge schools was matched with a comparison school that was similar in its percentage of students receiving free lunch, its racial/ethnic composition, and its historical achievement level. In addition to these advanced Core Knowledge sites, in three of these districts, located in Texas, Maryland, and Florida, we also tracked the progress of three newly implemented Core Knowledge schools. However, these schools were not matched to the comparison schools.

We studied two other advanced Core Knowledge schools in Colorado and in Ohio, but we were not able to recruit comparison schools in these sites, as other local schools did not want to be compared to Core Knowledge schools.[9] The Washington comparison site also declined to participate in Core Knowledge testing in the third year of the study, stating similar reasons. The remaining three schools in the study were newly implemented Core Knowledge schools located in districts in Maryland, Colorado, and Tennessee. These schools were not matched to control schools.

Therefore, our quantitative analyses focus on four advanced Core Knowledge schools and four comparison schools from Texas, Maryland, Florida, and, to a more limited extent, Washington. Other analyses employ this sample of eight schools along with three newly implemented Core Knowledge schools from Texas, Maryland, and Florida.

Longitudinal Samples and Measures

Standardized Achievement Tests. Except in cases where similar local achievement data were accepted, members of the research team administered two subtests from the Comprehensive Test of Basic Skills, Fourth Edition (CTBS/4) to third-through-fifth-grade-cohort students at three time points: (1) November and December of the 1995-1996 school year (i.e., pretest); (2) May of 1996; and (3) May of 1998 (i.e., posttest). First-through-third-grade students were tested at two of the three time points, during November or December of 1995 (i.e., pretest), and during May of 1998 (i.e., posttest). We derived Normal Curve Equivalent (NCEs) scores from the CTBS/4 Math Concepts and Applications subtest, and from the Reading Comprehension subtest.[10] In those cases in which we accepted outcomes from similar local tests, we converted the scores to the same NCE metric. These pretest and posttest NCE scores served as the covariates and outcome measures, respectively, in the analyses of students' achievements on standardized math and reading tests.

[9] It is possible that the fact that no school in either site was willing to be compared to local Core Knowledge schools is itself an indication of the perceived strength of the Core Knowledge curriculum.

[10] NCEs are normalized percentile scores, matching the percentile distribution at values of 1, 50, and 99, with a mean of 50 and a standard deviation of 21.06.

We obtained Spring 1998 reading and math achievement data for 653, or 65%, of the 1,011 third-through-fifth-grade-cohort students from the baseline sample. We collected complete three-wave longitudinal reading and math achievement data for 61%, or 621, of the 1,011 baseline third-through-fifth-grade students. Spring 1998 data collection yielded complete pretest-posttest math and reading data for 61% of the first-through-third-grade sample (663 of 1,093 students).

Core Knowledge Achievement Tests. In addition to the standardized achievement tests, with assistance from the Core Knowledge Foundation, we created Core Knowledge Achievement tests, which were administered to all participating third- and fifth-grade students in the Core Knowledge and comparison schools. We developed grade-specific tests for third- and fifth-grade students. The third-grade test was administered to the third-through-fifth-grade cohort of students during the spring of 1996, and to first-through-third-grade students during the final year of the study, when they were in third grade (May, 1998). Using the fifth-grade test, we retested the third-through-fifth-grade students during the final year of the study, when the students were in the fifth grade. Of the 1,093 first-through-third-grade students, 636, or 58%, completed the third-grade Core Knowledge Achievement test during the spring of 1998. For the third-through-fifth-grade cohort, 611 of the 1,011 students from the baseline sample, or 60%, completed both third- and fifth-grade Core Knowledge tests.

The Core Knowledge tests assessed students' achievements in three curriculum areas: (a) Language Arts; (b) Geography, World Civilization, and American Civilization (hereinafter referred to as "Social Studies"); and (c) Natural Sciences ("Science"). Each subtest administered to third graders contained 20 items. The Core Knowledge Achievement test administered to fifth graders included 16 Language Arts items, 19 Social Studies questions, and 13 Science items. With the exception of one question on the third-grade test, all items were closed-ended, multiple-choice items with 4 response options each. The one exception was an open-ended Social Studies essay item. The open-ended item asked students to write two sentences explaining why they would like to live in either Ancient Rome, Ancient Greece, or Colonial America. Students were graded on a scale of 0-3, where: 0 = no response or no facts given about that time period; 1 = one correct fact; 2 = one correct fact and two complete sentences or two correct facts and one complete sentence; and 3 = two or more facts and two complete sentences. The research team designed the third-grade items to assess students' acquisition of both factual knowledge and higher-order concepts and skills taught in the Core Knowledge curriculum at first grade (25% of items), second grade (25%), and third grade (50%). Fifty percent of the fifth-grade test items assessed facts, concepts, and skills taught at fifth grade, 25% covered fourth-grade content, and 25% covered third-grade content.

Psychometric analyses of the final third- and fifth-grade tests revealed good internal consistency for all subscales. After recoding all responses such that 0 = incorrect response and 1 = correct response, we computed Cronbach's alpha reliability coefficient as an index of the internal consistency reliability of each third- and fifth-grade subscale. Subtest reliability coefficients for the third-grade test, administered to third-through-fifth-grade students during the baseline spring of 1996, were $\alpha=0.73$, $\alpha=0.72$, and $\alpha=0.66$ for Language Arts, Social Studies, and Science, respectively. The third-grade test also was administered to first-through-third-grade students when they reached the third grade during the spring of 1998. Subtest reliability coefficients for the second administration of the third-grade test were $\alpha=0.77$, $\alpha=0.75$, and $\alpha=0.72$ for Language Arts, Social Studies, and Science, respectively. Psychometric analyses of the fifth-grade test, which was administered to the third-through-fifth-grade students when they reached the fifth grade during the final year of the study, revealed subtest reliability coefficients of $\alpha=0.55$, $\alpha=0.70$, and $\alpha=0.67$ for Language Arts, Social Studies, and Science, respectively.

We calculated raw numbers of correct responses by subtest for each student. The subtest raw scores were standardized by subtracting the subtest grand mean from each individual mean, and dividing the result by the pooled within-group standard deviation. For third-through-fifth-grade students, the third-grade Core Knowledge Achievement test, administered during the spring of 1996, represented the pretest, and the fifth-grade Core Knowledge Achievement test, administered during the spring of 1998, served as the posttest. The posttest for first-through-third-grade students was the third-grade Core Knowledge Achievement test, which was administered to the students during the spring of 1998. Analyses of first-through-third-grade students' Core Knowledge Achievement utilized the Spring 1996 reading NCE scores from standardized achievement tests as covariates.

Analytical Methods

Nested, longitudinal data present various analytical options related to the level at which the researcher chooses to synthesize and interpret the data. For instance, because Core Knowledge is a school-level intervention, analyses of school-level outcomes may be more appropriate than analyses of student-level outcomes. However, such analyses would artificially eliminate a large proportion of the variance existing between students. Multilevel models provide methods for overcoming the unit-of-analysis problem. These statistical models simultaneously assess multi-wave longitudinal growth, the student-specific effects on the growth trajectories, and the school-level variables that may influence student growth. However, statistically reliable school-level and multilevel analyses require larger samples of schools. The sample of Core Knowledge and comparison schools was simply not large enough to provide the statistical power necessary for detecting most school-level effects. Therefore, we performed most analyses at the student level. Although this choice is imperfect, due to the lack of independence among individuals nested within schools, we were left with few options.

Analyses of Four Comparison Schools and Seven Core Knowledge Schools. The first series of analyses included three newly implemented Core Knowledge schools from Florida, Maryland, and Texas along with the four advanced Florida, Maryland, Texas, and Washington Core Knowledge schools and their matched comparison schools. For these analyses, we specified separate two-way, site (i.e., Florida, Maryland, Texas, and Washington) by treatment (i.e., Core Knowledge versus comparison), multivariate analyses of covariance (MANCOVAs) by cohort for a general norm-referenced achievement factor, and for a Core Knowledge achievement factor. Univariate analyses of covariance were conducted for the following outcomes: (1) standardized math achievement; (2) standardized reading achievement; (3) Core Knowledge Language Arts achievement; (4) Core Knowledge Science achievement; and (5) Core Knowledge Social Studies achievement. If the site by treatment interactions were significant, we performed pairwise comparisons on all school means with a Bonferroni adjustment for multiple comparisons. Although univariate analyses were conducted where multivariate analyses yielded nonsignificant results, these univariate analyses should be interpreted with caution. Finally, although the three newly implemented Core Knowledge schools were not matched to the comparison schools, all analyses used pretest covariates, which partially take into account pre-existing differences among students between schools, and more fairly represent "value-added" school effects.

Analyses of Four Matched Pairs of Core Knowledge and Comparison Schools. The second analytical design also employed analysis of covariance, with the pretests as covariates. However, in this case, each analysis contrasted the outcomes for a cohort of students who attended an advanced Core Knowledge school to those for the cohort of students from the within-district, matched comparison school. We began by using MANCOVAs, with pretests as covariates. Two separate series of MANCOVAs produced Wilks's lambda statistics and tests of significance that indicated the Core Knowledge program effect on two factors: a general norm-referenced achievement factor; and a Core Knowledge achievement factor. Following the multivariate analyses, we computed univariate analyses of covariance (ANCOVAs) for the same outcomes noted above: norm-referenced reading achievement; norm-referenced math achievement; Core Knowledge Language Arts achievement; Core Knowledge Social Studies achievement; and Core Knowledge Science achievement. Although univariate analyses were conducted in several instances where multivariate analyses yielded nonsignificant results, these univariate analyses should be interpreted cautiously. These comparisons between matched Core Knowledge and comparison schools, which also control for the small pre-existing achievement differences among students between schools, may provide the best estimates of the "value-added" effect of the Core Knowledge sequence.

First-through-Third-Grade-Cohort Results:
Analyses of Four Comparison Schools and Seven Core Knowledge Schools

The analysis of the four comparison schools and seven Core Knowledge schools attended by students from the first-through-third-grade cohort began with a MANCOVA, with reading and math pretest NCE scores as covariates and reading and math posttest NCE scores as dependent measures. The multivariate analysis yielded a Wilks's lambda of .996, and revealed no significant main effect for the Core Knowledge factor. Therefore, although we performed univariate analyses for the reading and math outcomes, which we report below, the results from these analyses should be interpreted cautiously.

Reading Achievement. For the ANCOVA for first-through-third-grade-cohort students' reading achievement, Spring 1998 reading NCE was the dependent measure, and pretest reading

NCE served as the covariate. The results, which are summarized in Table 3, indicated that the main effect of Core Knowledge was not statistically significant, F (1, 434) = 0.13, p = .718. Significance tests for the Core Knowledge by site interaction, F (3, 434) = 3.46, p = .016, and for the site main effect, F (3, 434) = 20.16, p < .001, both revealed statistically significant results. Examination of the Core Knowledge and comparison school results by site, which are displayed in Table 3, reveal that control schools tended to post slightly higher adjusted mean reading scores, except in Florida. The small within-site control school advantages were not statistically significant, but pairwise comparisons revealed a significantly higher adjusted mean for the Florida Core Knowledge schools, M = 54.27, than for the Florida comparison school, M = 43.41.

Table 3: Summary of First-through-Third-Grade-Cohort Reading Achievement Results

	Core Knowledge Schools					Comparison Schools				
	N	Mean	SD	Adjusted Mean	SE	N	Mean	SD	Adjusted Mean	SE
Total Sample	320	51.92	20.55	51.19	.92	114	51.48	22.27	50.53	1.58
Florida	115	59.49	14.85	54.27*	1.54	21	45.76	21.03	43.41	3.48
Texas	74	46.53	18.78	53.23	1.92	35	46.86	20.16	53.59	2.74
Washington	60	62.21	20.52	58.98	2.07	40	63.59	21.15	62.16	2.52
Maryland	71	36.58	19.71	38.28	1.89	18	40.22	19.34	42.95	3.76

Note: * Pairwise comparison with Bonferroni adjustment indicates significantly higher Core Knowledge school mean than comparison school mean within site at p < .05.

Math Achievement. The ANCOVA for first-grade-cohort students' math achievement included Spring 1998 math NCE as the dependent measure, and pretest math NCE as the covariate. Table 4 summarizes the results. The analysis revealed nonsignificant results for both the main effect of Core Knowledge, F (1, 434) = 0.86, p = .355, and for the Core Knowledge by site interaction effect, F (3, 434) = 1.51, p = .211. However, the main effect of site was significant, F (3, 434) = 11.55, p < .001, indicating considerable variability in posttest math scores across the four states. Pairwise comparisons revealed significantly higher posttest math scores for Washington, Texas, and Florida schools relative to Maryland schools, and significantly higher posttest scores for Florida schools relative to Washington schools.

Core Knowledge Achievement. The multivariate analysis for first-through-third-grade students included the pretest reading NCE as a covariate, and the three Core Knowledge subtests, Language Arts, Science, and Social Studies, as the outcomes. As stated earlier, the Washington comparison school declined to take the Core Knowledge posttest. Therefore, this analysis included a smaller sample of six Core Knowledge and three comparison schools from Maryland, Florida, and Texas. The MANCOVA yielded a Wilks's lambda of .775, and revealed a significant Core Knowledge main effect ($p < .001$). Below, we report the results of the univariate analyses of Core Knowledge achievement.

Table 4: Summary of First-through-Third-Grade-Cohort Math Achievement Results

	Core Knowledge Schools					Comparison Schools				
	N	Mean	SD	Adjusted Mean	SE	N	Mean	SD	Adjusted Mean	SE
Total Sample	320	54.24	21.99	51.96	.92	114	48.58	21.62	50.26	1.59
Florida	115	67.87	16.59	61.96	1.55	21	55.76	23.28	53.99	3.49
Texas	74	49.72	19.47	55.37	1.91	35	46.23	21.83	52.88	2.75
Washington	60	55.42	17.87	50.12	2.10	40	52.22	18.83	50.77	2.53
Maryland	71	35.87	20.51	40.40	1.93	18	36.67	21.17	43.38	3.80

Core Knowledge Achievement: Language Arts. Analysis of first-through-third-grade-cohort students' Spring 1998 outcomes on the Core Knowledge Language Arts test included the pretest reading NCE as a covariate. The results for the Core Knowledge Language Arts subtest, which are outlined in Table 5, indicate a significant Core Knowledge main effect, $F\ (1, 342) = 17.42$, $p < .001$, a significant site main effect, $F\ (2, 342) = 12.59$, $p < .001$, and a significant Core Knowledge by site interaction, $F\ (2, 342) = 8.98$, $p < .001$. Follow-up comparisons revealed that Core Knowledge adjusted means were higher than comparison school adjusted means within all three sites analyzed, but significant within-site differences favoring Core Knowledge were found for Texas only.

Table 5: Summary of First-through-Third-Grade-Cohort Core Knowledge Language Arts Results

	Core Knowledge Schools					Comparison Schools				
	N	Mean	SD	Adjusted Mean	SE	N	Mean	SD	Adjusted Mean	SE
Total Sample	254	-.04	.91	-.11[a]	.05	88	-.62	.97	-.53	.09
Florida	120	.17	.80	-.03	.08	24	-.19	.75	-.27	.16
Texas	73	.17	.80	.38*	.10	39	-.81	1.00	-.61	.13
Maryland	61	-.70	.92	-.67	.10	25	-.73	1.01	-.70	.16

Note: * Pairwise comparison with Bonferroni adjustment indicates significantly higher Core Knowledge school mean than comparison school mean within site at $p < .05$.

[a] Core Knowledge main effect significant at $p < .001$.

Core Knowledge Achievement: Science. Analysis of first-grade-cohort students' Spring 1998 outcomes on the Core Knowledge Science test included the pretest reading NCE as a covariate. Again, the results for the Core Knowledge Science subtest indicate a significant Core Knowledge main effect, $F\ (1, 342) = 9.85$, $p = .002$, a significant site main effect, $F\ (2, 342) =$

38.70, $p < .001$, and a significant Core Knowledge by site interaction, F (2, 342) = 7.83, $p < .001$. Follow-up comparisons revealed a pattern similar to that which was found for the Language Arts subtest. As the results in Table 6 suggest, Core Knowledge and comparison school adjusted means were similar within Maryland, whereas Texas Core Knowledge achievement was significantly higher than Texas comparison achievement. In Florida, Core Knowledge achievement was higher than comparison achievement, but the difference did not reach statistical significance.

Core Knowledge Achievement: Social Studies. Again, the analysis of the final Core Knowledge subtest, Social Studies, included the pretest reading NCE as a covariate. Table 7 summarizes the results of the analysis. The main effects for Core Knowledge, F (1, 342) = 92.71, $p < .001$, and for site, F (2, 342) = 17.15, $p < .001$, were significant, as was the Core Knowledge by site interaction, F (2, 342) = 19.14, $p < .001$. The follow-up comparisons revealed consistent within-site achievement advantages for Core Knowledge schools, and statistically significant within-site differences favoring Texas and Florida Core Knowledge schools on the posttest.

Table 6: Summary of First-through-Third-Grade-Cohort Core Knowledge Test Science Results

	Core Knowledge Schools					Control Schools				
	N	Mean	SD	Adjusted Mean	SE	N	Mean	SD	Adjusted Mean	SE
Total Sample	254	-.10	.93	-.20[a]	.05	88	-.52	.77	-.49	.08
Florida	120	.14	.78	.00	.07	24	-.19	.74	-.25	.15
Texas	73	.25	.81	.39*	.09	39	-.50	.72	.35	.12
Maryland	61	-1.01	.71	-.99	.09	25	-.89	.76	-.86	.15

Note: * Pairwise comparison with Bonferroni adjustment indicates significantly higher Core Knowledge school mean than comparison school mean within site at $p < .05$.

[a] Core Knowledge main effect significant at $p < .001$.

Table 7: Summary of First-through-Third-Grade-Cohort Core Knowledge Test Social Studies Results

	Core Knowledge Schools					Control Schools				
	N	Mean	SD	Adjusted Mean	SE	N	Mean	SD	Adjusted Mean	SE
Total Sample	254	.04	.92	-.04[a]	.06	88	-1.04	.71	-.94	.08
Florida	120	.23	.73	.09*	.07	24	-.46	.50	-.52	.15
Texas	73	.32	.93	.47*	.09	39	-1.35	.73	-1.20	.12
Maryland	61	-.70	.86	-.68	.09	25	-1.12	.49	-1.09	.15

Note: * Pairwise comparison with Bonferroni adjustment indicates significantly higher Core Knowledge school mean than comparison school mean within site at $p < .05$.

[a] Significant Core Knowledge main effect, $p < .001$.

Analyses of Four Matched Pairs of Core Knowledge and Comparison Schools

As stated in our discussion of the analytic methods, the second series of analyses also employed analysis of covariance, with the pretests as covariates. In this case, though, we contrasted the outcomes for students who attended an advanced Core Knowledge school to those for the cohort of students from the within-district, matched comparison school. Therefore, these analyses provided four site-specific tests of the potential impacts of Core Knowledge. Again, because the Washington comparison school declined to take the Core Knowledge achievement posttest, our analyses of the outcomes of the Core Knowledge subtests were restricted to three sites, Florida, Texas, and Maryland.

We specified separate MANCOVAs and ANCOVAs for each matched pair of Core Knowledge and comparison schools. In addition, we calculated separate effect size estimates for Core Knowledge from each of the sites. Effect sizes were calculated as the covariate-adjusted difference between the Core Knowledge and comparison students' mean posttest scores. Specifically, following procedures similar to those outlined by Glass, McGaw, and Smith (1981), we calculated effect sizes as

$$(M_T - M_C) = (M_{T\,Post} - M_{C\,Post}) - \beta_{y \bullet x}\,(M_{T\,Pre} - M_{C\,Pre}),\text{ and}$$

$$(M_T - M_C) / \sigma,$$

where $M_{T\ Post}$ and $M_{C\ Post}$ are, respectively, the treatment (Core Knowledge) and comparison students' unadjusted mean posttest scores, $\beta_{y \bullet x}$ is the pooled within-groups estimate of the regression of posttest on pretest, and $M_{T\ Pre}$ and $M_{C\ Pre}$ are, respectively, the treatment and comparison school mean pretest scores. The resulting estimate of the mean posttest difference between treatment and control was then divided, or standardized, by the pooled posttest standard deviation. Overall Core Knowledge effect sizes for each measure were calculated as the averages across sites.

Finally, we assessed the potential equity effects associated with Core Knowledge by performing additional analyses of the outcomes for low-achieving students. Using the same methods as those outlined above, we focused on the outcomes for students from Core Knowledge and comparison schools who scored at or below the 33rd percentile on the pretests. Due to relatively small sample sizes, though, these analyses must be considered exploratory rather than conclusive.

Norm-Referenced Test Outcomes. Table 8 summarizes the results of these analyses. The analyses of the four comparison schools and four Core Knowledge schools attended by students from the first-through-third-grade cohort began with MANCOVAs, with reading and math pretest NCE scores as covariates and reading and math posttest NCE scores as dependent measures. Of the four comparisons, only one multivariate analysis, for the Florida site, was statistically significant. Univariate analyses for the Florida site showed a significant effect for the reading outcome ($p < .01$), but no significant effect for the math outcome.

Table 8: Summary of Core Knowledge Effects on Norm-Referenced Reading and Math Outcomes, First-through-Third-Grade Cohort

First through Third Grade		Florida CK	Florida Control	F	Texas CK	Texas Control	F	Washington CK	Washington Control	F	Maryland CK	Maryland Control	F	All Schools ES
Wilks's Lambda		0.93		3.73*	0.99		0.26	0.95		2.72	1.00		0.05	
All Students														
Pretest Math	M	65.49	54.71	3.34	26.41	36.57	0.18	62.30	54.03	0.22	28.11	36.44	0.03	
	(SD)	(21.61)	(24.68)		(18.02)	(15.01)		(21.74)	(25.58)		(18.93)	(17.93)		
Posttest Math	Adj. M	66.19	58.80		44.78	42.99		53.63	54.91		31.57			
	(SE)	(1.78)	(3.60)		(2.83)	(3.00)		(1.72)	(2.11)		(2.42)	32.38		
	ES	+.40			+.09			-.07			-.61			-.05
Pretest Reading	M	58.13	52.48	8.40**	29.36	35.43	0.64	54.13	50.75	2.13	35.85	42.94	0.59	
	(SD)	(15.94)	(16.68)		(19.05)	(18.88)		(17.57)	(19.91)		(16.32)	(22.66)		
Posttest Reading	Adj. M	58.62	47.93		42.09	45.16		61.09	65.28		34.09	38.10		
	(SE)	(1.64)	(3.29)		(2.62)	(2.77)		(1.81)	(2.22)		(2.73)	(4.40)		
	ES	+.61			-.16			-.20			-.50			-.06
M	ES	+.51			-.04			-.14			-.56			-.06
	N	84	21		39	35		60	40		46	18		
Low 33%														
Pretest Math	M	19.50	26.00	1.54	15.65	26.80	0.78	29.83	29.25	2.13	18.14	23.00	0.01	
	(SD)	(17.68)	(9.77)		(11.63)	(10.73)		(7.00)	(8.60)		(13.01)	(14.50)		
Posttest Math	Adj. M	50.13	41.75		40.03	35.09		39.91	32.53		24.39			
	(SE)	(5.65)	(3.51)		(3.30)	(4.18)		(3.82)	(3.31)		(2.42)	24.81		
	ES	+1.12			+.28			+.61			-.49			+.38
Pretest Reading	M	23.00	31.20	3.57	17.48	21.53	1.17	30.17	28.37	1.17	25.69	18.57	3.80	
	(SD)	(14.14)	(5.07)		(11.68)	(9.80)		(9.06)	(8.62)		(10.24)	(14.14)		
Posttest Reading	Adj. M	61.47	27.01		33.83	39.25		39.78	46.69		24.57	39.08		
	(SE)	(14.89)	(8.88)		(3.11)	(3.87)		(4.81)	(4.16)		(3.20)	(6.64)		
	ES	+1.59			-.35			-.16			-.59			+.12
M	ES	+1.36			-.04			+.23			-.54			+.25
	N	2	5		23	15		6	8		29	7		

Note. CK = Core Knowledge, ES = Effect Size.
*** $p < .001$ ** $p < .01$ * $p < .05$.

The results in Table 8 indicate that, in every case, math achievement effect sizes for the lowest achieving students were larger than those for students in general. However, this pattern was not as consistent for the reading outcome. Across the four sites, the average Core Knowledge effect size for norm-referenced math and reading achievement was close to 0, ES = -.06, for all students. In contrast, the overall effect for the lowest achieving students was +.25. Although none of the Core Knowledge effects on low-achieving students reached statistical significance, this result was influenced by the small sample sizes.

Core Knowledge Test Outcomes. The results of the analyses for all first-through-third-grade students are presented in Table 9. The multivariate analyses included the norm-referenced reading pretest score as a covariate, and the standardized posttest scores from the three Core Knowledge subtests as the dependent variables. The results were statistically significant for the Florida and Texas sites ($p < .001$), but were not for the Maryland site. The univariate analyses showed consistent significant effects on all measures across the Texas site. Significant effects for the Florida site were found for the Social Studies subtest ($p < .001$), while results for the Language Arts and Science outcomes approached statistical significance. Although no significant results were found for the Maryland site, the low-implementing Maryland Core Knowledge school did post higher adjusted means on two of three subtests. Overall, the average effect size across sites and across Core Knowledge subtests was +.57.

The Core Knowledge test outcomes for the lowest achieving students are displayed at the bottom of Table 9. Posttest scores for Core Knowledge students who scored at or below the 33rd percentile on the norm-referenced reading pretest tended to be higher than those for comparison students. However, the average effect sizes for all three subtests were slightly lower than those presented for Core Knowledge students in general. The overall effect size, across all schools and measures, of +.44 was somewhat lower than the overall effect size of +.57 for Core Knowledge students in general.

Summary of First-through-Third-Grade-Cohort Results

The bar chart below, labeled Figure 8, summarizes the Core Knowledge effect size estimates for each of the outcomes. Figure 12 summarizes the effect size estimates for each Core Knowledge school. These estimates represent differences between the Core Knowledge and comparison covariate-adjusted outcomes expressed in standard deviation units. In general, an effect size of about .25 or more is considered educationally meaningful (Cohen, 1988). To provide a sense of scale, an effect size of 1.0 is equivalent to 100 points on the Scholastic Aptitude Test (SAT) scale, 15 points of IQ, 2 stanines, or 21 NCE points.

Table 9: Summary of Core Knowledge Effects on Core Knowledge Test Outcomes, First-through-Third-Grade Cohort

First through Third Grade		Florida CK	Florida Control	F	Texas CK	Texas Control	F	Maryland CK	Maryland Control	F	All Schools ES
Wilks's Lambda		0.84		6.85***	0.54		20.06***	0.92		1.81	
All Students											
Pretest Reading	M	44.32	50.42		27.83	35.44		37.85	44.32		
	(SD)	(18.92)	(15.79)		(18.88)	(18.57)		(15.59)	(18.92)		
Posttest LA	Adj. M	.21	-.10	3.08	.07	-.89	21.59***	-.70	-.83	0.34	
	(SE)	(.08)	(.15)		(.15)	(.14)		(.14)	(.18)		
	ES	+.37			+.93			+.14			+.48
Posttest SC	Adj. M	.17	-.12	2.83	.31	-.56	28.10***	-1.09	-.92	0.75	
	(SE)	(.08)	(.15)		(.12)	(.11)		(.12)	(.15)		
	ES	+.36			+1.03			-.36			+.34
Posttest SS	Adj. M	.27	-.40	19.81***	.23	-1.41	59.11***	-.84	-1.16	2.82	
	(SE)	(.07)	(.13)		(.15)	(.15)		(.11)	(.15)		
	ES	+.89			+1.36			+.42			+.89
M	ES	+.54			+1.11			+.07			+.57
	N	91	24		36	39		41	25		

Note. ES = Effect Size, CK = Core Knowledge.
LA = Language Arts, SC = Science, SS = Social Studies.
*** $p < .001$, ** $p < .01$, * $p < .05$.

Table 9 (cont.)

First through Third Grade		Florida CK	Florida Control	Florida F	Texas CK	Texas Control	Texas F	Maryland CK	Maryland Control	Maryland F	All Schools ES
Low 33% Pretest Reading	M	31.72	32.86		17.80	21.05		28.00	27.09		
	(SD)	(7.23)	(5.01)		(11.26)	(10.11)		(9.51)	(11.96)		
Posttest LA	Adj. M	-.34	-.51	0.18	-.05	-1.30	23.38***	-1.10	-1.13	0.01	
	(SE)	(.21)	(.34)		(.17)	(.19)		(.17)	(.25)		
	ES	+.19			+1.17			+.03			+.46
Posttest SC	Adj. M	-.24	-.34	0.09	.11	-.79	15.56***	-1.25	-.85	2.12	
	(SE)	(.18)	(.29)		(.15)	(.17)		(.15)	(.24)		
	ES	+.13			+1.02			-.57			+.19
Posttest SS	Adj. M	-.10	-.55	2.47	.17	-1.63	38.93***	-1.11	-1.03	0.09	
	(SE)	(.15)	(.24)		(.19)	(.21)		(.14)	(.22)		
	ES	+.71			+1.39			-.11			+.66
M	ES	+.34			+1.19			-.22			+.44
	N	18	7		25	21		26	11		

Note. ES = Effect Size, CK = Core Knowledge.
LA = Language Arts, SC = Science, SS = Social Studies.
*** $p < .001$, ** $p < .01$, * $p < .05$.

Figure 8: Core Knowledge Effect Sizes for the First-through-Third-Grade Cohort by Test

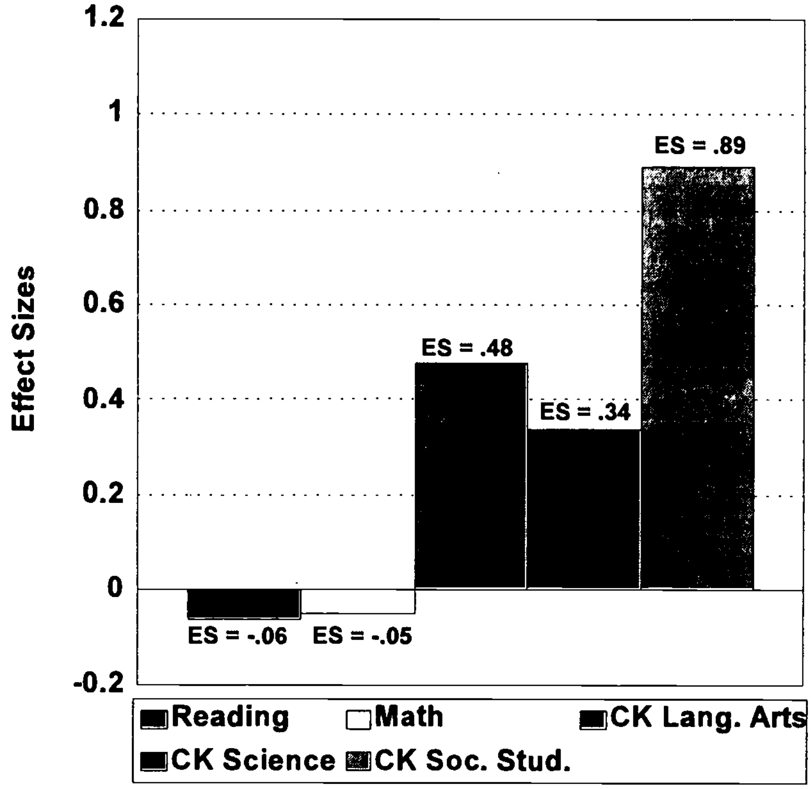


Figure 9: First-through-Third-Grade-Cohort Core Knowledge Effect Sizes by Test for Schools with Implementation Rates Greater than 50%.

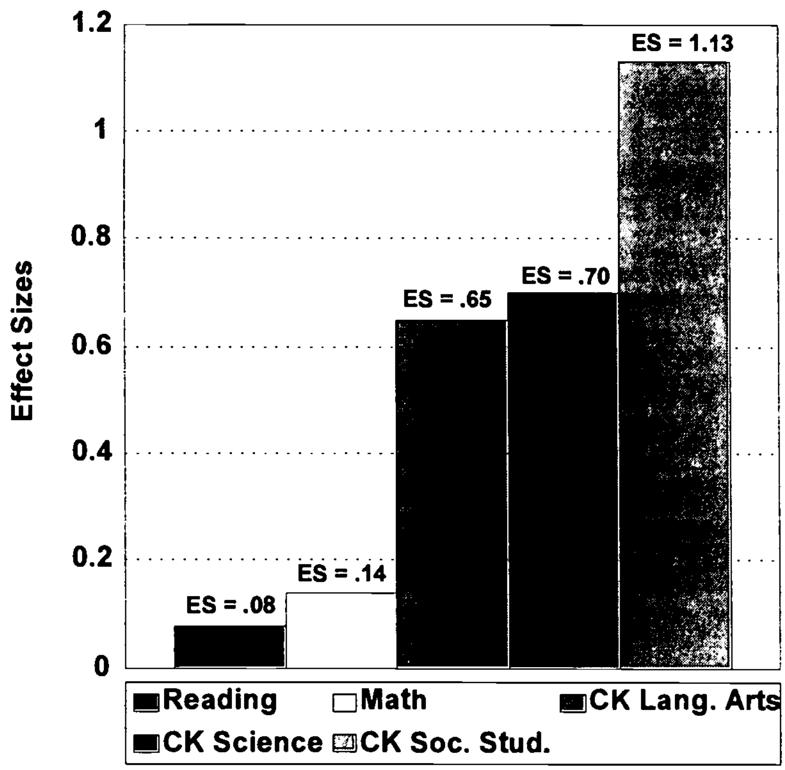


Figure 10: Core Knowledge Effect Sizes for Low-Achieving Students in the First-through-Third-Grade Cohort by Test

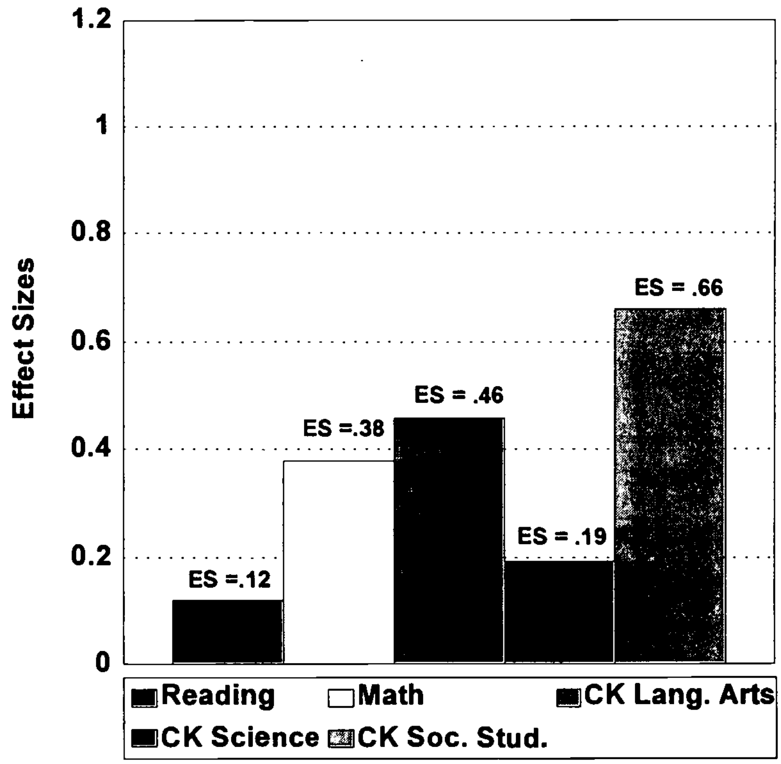


Figure 11: First-through-Third-Grade-Cohort Core Knowledge Effect Sizes by Test for Low-Achieving Students in Schools with Implementation Rates Greater than 50%.

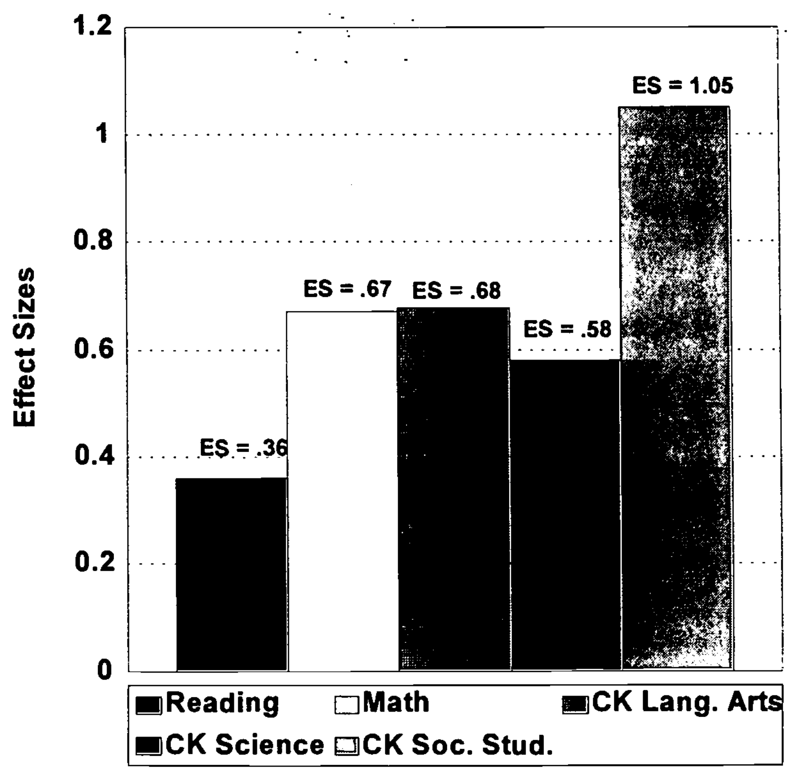


Figure 12: Core Knowledge Effect Sizes for the First-through-Third-Grade Cohort by Test, by School

Figure 12A. Florida

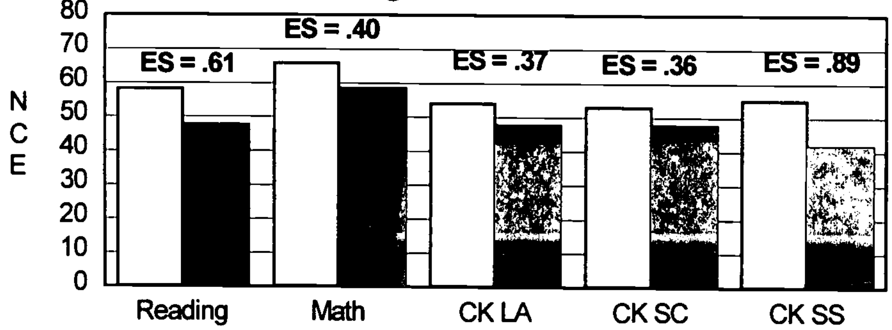


Figure 12B. Texas

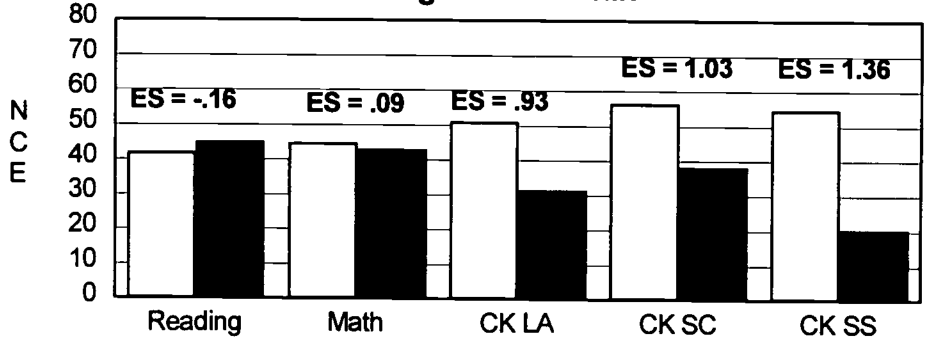


Figure 12C. Maryland

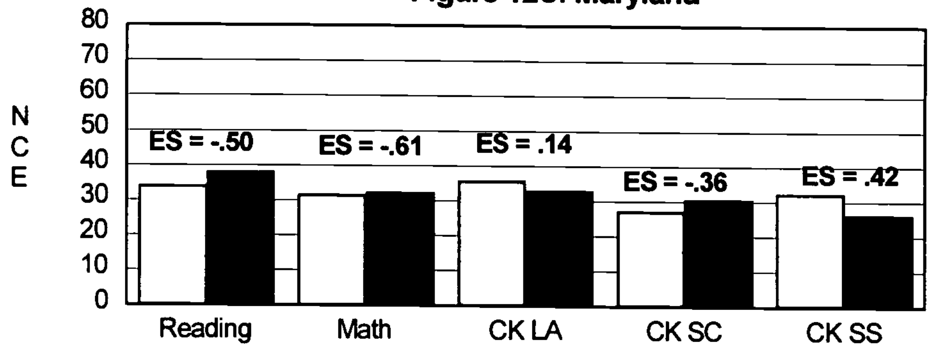


Figure 12D. Washington

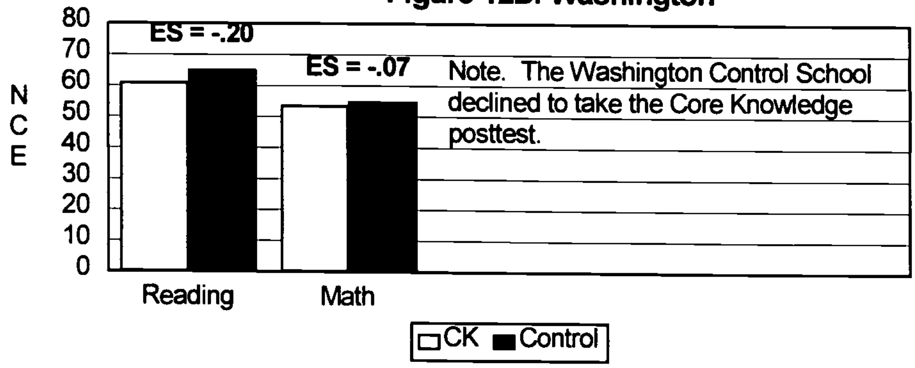


Figure 8 shows that the Core Knowledge effect sizes for two of three Core Knowledge test outcomes, Language Arts and Social Studies, were large and educationally meaningful. The small, negative effect sizes for the norm-referenced reading and math tests suggest that there is, essentially, no difference between the Core Knowledge and comparison schools on these outcomes.

However, a recurring theme in the analysis of all outcomes has been the negative outlier status of the Maryland Core Knowledge schools. As previous sections have indicated, the Core Knowledge curriculum was not well implemented in the Maryland schools. Figure 13, which plots the correlations between level of implementation and math and reading pretest-posttest NCE gains, illustrates the relatively strong correlation between level of implementation and achievement gains. When one excludes those schools in which less than 50% of the classroom teachers implemented Core Knowledge, Core Knowledge effect size estimates increase. Figure 9 illustrates this point quite clearly, especially with regard to the large effect size increases for all Core Knowledge test outcomes.

Figures 10 and 11 illustrate the potential equity effects associated with Core Knowledge implementation. Both figures display the effect sizes for students who began the study with pretest scores in the bottom 33% of the distribution. Low achievers' outcomes on the Core Knowledge tests were similar to those found for all Core Knowledge students. However, effect sizes for the reading and math norm-referenced outcomes reveal stronger effects for low achievers than for students in general, especially in math. The sample sizes for these analyses were small, so the results should be interpreted cautiously. However, these findings are suggestive of the potential equalizing effects of Core Knowledge.

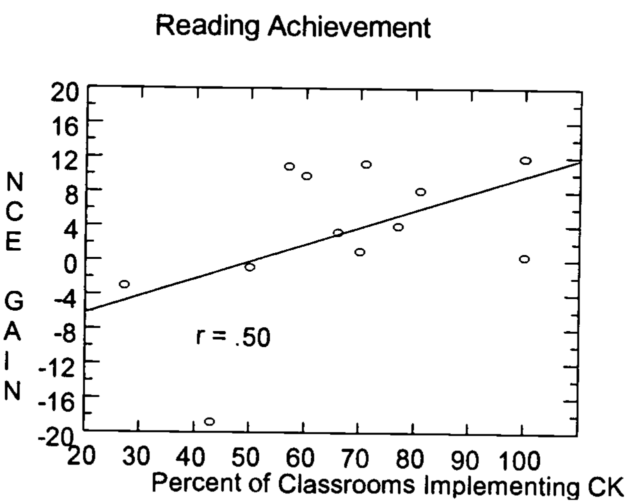
Third-through-Fifth-Grade-Cohort Results:
Analyses of Four Comparison Schools and Seven Core Knowledge Schools

Analysis of the four comparison schools and seven Core Knowledge schools attended by students from the third through fifth grade began with a MANCOVA, with reading and math pretest NCE scores as covariates and reading and math posttest NCE scores as dependent measures. The multivariate analysis yielded a Wilks's lambda of .997, and revealed no significant main effect for the Core Knowledge factor. Again, although we report results from the univariate analyses of the norm-referenced reading and math outcomes, these results should be interpreted cautiously.

Reading Achievement. For the ANCOVA for third-through-fifth-grade students' reading achievement, Spring 1998 reading NCE was the dependent measure, and pretest reading NCE served as the covariate. The results, which are summarized in Table 10, indicate that the main effect of Core Knowledge was not statistically significant, F (1, 507) = 0.17, p = .679. Significance tests for the Core Knowledge by site interaction, F (3, 507) = 9.74, p< .001, and for the site main effect, F (3, 507) = 39.24, p < .001, both revealed statistically significant results. Pairwise comparisons within districts revealed a significantly higher adjusted mean for the Texas significantly higher adjusted mean for the Maryland comparison school ($\underline{M}$ = 50.24) than for the Maryland Core Knowledge schools ($\underline{M}$ = 35.39).

Math Achievement. The ANCOVA for third-grade-cohort students' math achievement included Spring 1998 math NCE as the dependent measure and pretest math NCE as the covariate. The results, summarized in Table 11, indicate, as with reading achievement, that the main effect of Core Knowledge was not statistically significant, $\underline{F}$ (1, 507) = 0.87, $\underline{p}$ = .35. However, significance tests for the Core Knowledge by site interaction, $\underline{F}$ (3, 507) = 7.54, $\underline{p}$ < .001, and for the site main effect, $\underline{F}$ (3, 507) = 13.78, $\underline{p}$ < .001, both revealed statistically significant results. Pairwise comparisons within district revealed that the Washington Core Knowledge schools' adjusted mean for math achievement ($\underline{M}$=69.52) was significantly greater than the Washington comparison school adjusted mean ($\underline{M}$=59.86). In contrast, Maryland Core Knowledge schools scored significantly lower in math achievement than the Maryland comparison school.

Figure 13: Effect Size by Level of Implementation for the First-through-Third-Grade Cohort



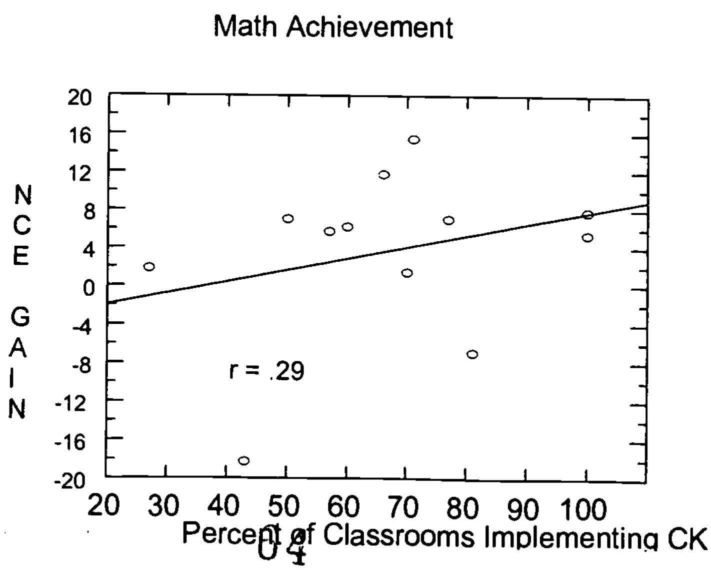


Table 10: Summary of Third-through-Fifth-Grade-Cohort Reading Achievement Results

	Core Knowledge Schools					Comparison Schools				
	N	Mean	SD	Adjusted Mean	SE	N	Mean	SD	Adjusted Mean	SE
Total Sample	345	52.81	21.35	52.01	.74	162	51.47	18.15	51.45	1.13
Florida	131	60.01	18.55	54.41	1.18	52	53.13	19.15	50.21	1.85
Texas	78	47.26	16.77	51.80*	1.50	47	46.21	15.81	44.58	1.94
Washington	72	64.62	17.29	66.14	1.56	44	59.47	17.64	60.77	2.00
Maryland	64	31.25	18.10	35.39	1.63	19	41.37	13.49	50.24*	3.08

Note: * Pairwise comparison with Bonferroni adjustment indicates significant, $p < .05$, within-site difference favoring school mean marked by asterisk.

Table 11: Summary of Third-through-Fifth-Grade-Cohort Math Achievement Results

	Core Knowledge Schools					Comparison Schools				
	N	Mean	SD	Adjusted Mean	SE	N	Mean	SD	Adjusted Mean	SE
Total Sample	345	60.36	23.65	59.05	.82	162	56.36	18.39	57.66	1.26
Florida	131	69.42	21.56	59.91	1.86	52	59.10	19.16	56.98	2.04
Texas	78	56.11	19.50	63.35	1.70	47	58.28	18.92	57.91	2.14
Washington	72	69.11	18.25	69.52*	1.73	44	55.00	16.83	59.86	2.23
Maryland	64	37.16	20.65	43.44	1.85	19	47.32	16.39	55.88*	3.39

Note: * Pairwise comparison with Bonferroni adjustment indicates significant, $p < .05$, within-site difference favoring school mean marked by asterisk.

Core Knowledge Achievement. The MANCOVA for third-through-fifth-grade students included pretest scores on the three Core Knowledge subtests, Language Arts, Science, and Social Studies, as covariates, and posttest scores on the three measures as the outcomes. This analysis included a smaller sample of six Core Knowledge and three comparison schools from Maryland, Florida, and Texas. As stated previously, the Washington comparison school declined to take the Core Knowledge posttest. The MANCOVA yielded a Wilks's lambda of .927, and indicated a significant Core Knowledge main effect ($p < .001$). The results of the univariate analyses of the three Core Knowledge subtests are reported below.

Core Knowledge Achievement: Language Arts. For the ANCOVA for third-grade-cohort students' Core Knowledge Language Arts subtest score, the Spring 1998 Core Knowledge Language Arts outcome was the dependent measure, and the pretest Core Knowledge Language Arts outcome served as the covariate. The results, which are summarized in Table 12, indicated that the main effect of Core Knowledge was statistically significant, F (1, 401) = 6.54, p = .011, as was the main effect of site, F (2, 401) = 6.16, p = .002. The significance test for the Core Knowledge by site interaction, F (2, 401) = 1.46, p = .234, did not reveal statistically significant results.

Table 12: Summary of Third-through-Fifth-Grade-Cohort Core Knowledge Test Language Arts Results

	Core Knowledge Schools					Comparison Schools				
	N	Mean	SD	Adjusted Mean	SE	N	Mean	SD	Adjusted Mean	SE
Total Sample	281	.07	.90	-.01[b]	.05	120	-.27	.86	-.27	.08
Florida	143	.29	.83	.20	.07	48	-.26	.89	-.27	.12
Texas	74	.10	.96	.11	.10	51	-.13	.88	-.05	.12
Maryland	64	-.43	.77	-.35	.11	21	-.61	.67	-.48	.18

Note: [b] Core Knowledge main effect significant at $p < .05$.

Core Knowledge Achievement: Science. The ANCOVA for third-through-fifth-grade students' Core Knowledge Science achievement modeled the Spring 1998 Core Knowledge Science outcome as the dependent measure and the pretest Core Knowledge Science measure as the covariate. The results, summarized in Table 13, indicate that the main effect of Core Knowledge was statistically significant, F (1, 401) = 36.80, $p < .001$. Significance tests for the Core Knowledge by site interaction, F (2, 401) = 12.12, $p < .001$, and for the site main effect, F (2, 401) = 13.82, $p < .001$, also revealed statistically significant results. Within-district pairwise comparisons revealed that Texas and Florida Core Knowledge schools significantly outperformed their respective comparison school on the Core Knowledge Science subtest.

Core Knowledge Achievement: Social Studies. The ANCOVA for third-through-fifth-grade students' Core Knowledge Social Studies subtest score included the Spring 1998 Core Knowledge Social Studies measure as the dependent variable, and the pretest Core Knowledge Social Studies measure as the covariate. The results, which are summarized in Table 14, indicated that the main effect of Core Knowledge was statistically significant, F (1, 401) = 14.16, $p < .001$, as was the main effect of site, F (2, 401) = 17.88, $p < .001$. There was no significant Core Knowledge by site interaction effect, F (2, 401) = 2.38, p = .094.

Table 13: Summary of Third-through-Fifth-Grade-Cohort Core Knowledge Test Science Results

	Core Knowledge Schools					Comparison Schools				
	N	Mean	SD	Adjusted Mean	SE	N	Mean	SD	Adjusted Mean	SE
Total Sample	281	.12	1.00	-.05[a]	.05	120	-.59	.78	-.58	.07
Florida	143	.58	.83	.50*	.06	48	-.40	.90	-.55	.11
Texas	74	.13	.90	.05*	.09	51	-.67	.62	-.56	.11
Maryland	64	-.92	.65	-.69	.10	21	-.83	.75	-.63	.17

Note: * Pairwise comparison with Bonferroni adjustment indicates significantly higher Core Knowledge school mean than comparison school mean within site at $p < .05$.

[a] Significant Core Knowledge main effect, $p < .001$.

Table 14: Summary of Third-through-Fifth-Grade-Cohort Core Knowledge Test Social Studies Results

	Core Knowledge Schools					Comparison Schools				
	N	Mean	SD	Adjusted Mean	SE	N	Mean	SD	Adjusted Mean	SE
Total Sample	281	-.03	.92	-.17[a]	.04	120	-.69	.60	-.50	.07
Florida	143	.09	.87	-.08	.06	48	-.68	.63	-.55	.10
Texas	74	.36	.87	.22	.08	51	-.60	.47	-.27	.10
Maryland	64	-.76	.64	-.63	.09	21	-.93	.76	-.69	.15

Note: [a] Core Knowledge main effect significant at $p < .001$.

Analyses of Four Matched Pairs of Core Knowledge and Comparison Schools

The second series of analyses of the third-to-fifth-grade students' outcomes also employed analysis of covariance, with the pretests as covariates. These analyses contrasted the outcomes for students who attended an advanced Core Knowledge school to those for the cohort of students from the within-district, matched comparison school. As we reported for the first-to-third-grade cohort, the Washington comparison school declined to take the Core Knowledge achievement posttest, and, thus, our analyses of the outcomes of the Core Knowledge subtests were restricted to three sites, Florida, Texas, and Maryland.

Norm-Referenced Test Outcomes. Table 15 summarizes the results of these analyses. The analyses of the four comparison schools and four Core Knowledge schools attended by students from the third-through-fifth-grade cohort began with MANCOVAs, with reading and math pretest NCE scores as covariates and reading and math posttest NCE scores as dependent measures. Two of the four multivariate analyses, for the Washington and Maryland sites, were statistically significant. Univariate analyses for the Washington site showed statistically significant Core Knowledge effects for both reading ($p < .05$), and for math ($p < .001$). Univariate analyses for the Maryland site indicated significant differences between the Core Knowledge and comparison school for reading ($p < .001$) and for math ($p < .001$), but these differences favored the Maryland comparison school. Although the univariate analyses for Florida and Texas must be interpreted cautiously, they indicated a significantly higher math score for the Texas Core Knowledge school ($p < .05$), and a significantly higher reading score for the Florida Core Knowledge school ($p < .05$).

The results for the third-through-fifth-grade students presented in Table 15 indicate that math and reading achievement outcomes for the lowest achieving Core Knowledge students were worse than those for Core Knowledge students in general. Significance tests for the lowest achieving students indicated that Maryland and Florida comparison students significantly outperformed the Core Knowledge students in math (respectively, $p < .001$ and $p < .05$). Further, Maryland comparison students posted a significantly higher reading posttest score than did Maryland Core Knowledge students ($p < .01$). The average Core Knowledge effect size for norm-referenced math and reading achievement was close to 0, ES = -.11, for all students. In contrast, the overall effect for the lowest achieving students was -.53.

Core Knowledge Test Outcomes. The results of the analyses for all third-through-fifth-grade students are presented in Table 16. The multivariate analyses included the three Core Knowledge subtests, Language Arts, Science, and Social Studies, as covariates, and the standardized posttest scores from the three Core Knowledge subtests as the dependent variables. The results were statistically significant for the Florida and Texas sites (respectively, $p < .001$ and $p < .01$), but were not for the Maryland sites.

Univariate analyses showed consistent significant effects on all measures across both Florida and Texas sites. Similar to the results for the first-through-third grade students, although the Maryland Core Knowledge students did not reach significantly higher posttest scores, they did post higher adjusted means on two of three subtests. Across the sites and across Core Knowledge subtests, the average effect size was +.48.

The Core Knowledge test outcomes for the lowest achieving students are presented at the bottom of Table 16. Posttest scores for Core Knowledge students who scored at or below the 33rd percentile on the norm-referenced reading pretest tended to be higher than those for comparison students. The average effect sizes for all three subtests were about the same as those for Core Knowledge students in general. The overall effect size for low achievers, across all schools and measures, of +.42 was comparable to the overall effect size of +.48 for Core Knowledge students in general.

Table 15: Summary of Core Knowledge Effects on Norm-Referenced Reading and Math Outcomes, Third-through-Fifth-Grade Cohort

Third through Fifth Grade		Florida CK	Florida Control	F	Texas CK	Texas Control	F	Washington CK	Washington Control	F	Maryland CK	Maryland Control	F	All Schools ES
Wilks's Lambda		0.98		1.20	0.93		2.76	0.85		9.70***	0.57		19.19***	
All Students														
Pretest Math	M	64.81	58.35	0.43	38.64	55.77	4.75*	54.63	48.08	13.07***	45.00	42.63	19.83***	
	(SD)	(19.74)	(23.02)		(22.89)	(17.81)		(13.99)	(16.50)		(17.46)	(18.27)		
Posttest Math	Adj. M	63.38	61.77		60.67	52.74		66.89	58.63		28.46	48.08		
	(SE)	(1.55)	(1.93)		(2.64)	(2.29)		(1.39)	(1.78)		(2.54)	(3.59)		
	ES	+.08				+.37		+.44			-1.00			-.03
Pretest Reading	M	55.58	56.11	4.16*	39.17	54.00	0.95	48.77	49.23	5.76*	46.63	36.89	32.15***	
	(SD)	(22.51)	(23.30)		(22.21)	(14.95)		(17.18)	(13.26)		(12.19)	(10.34)		
Posttest Reading	Adj. M	57.62	52.95		46.40	43.220		64.76	59.24		24.00	46.31		
	(SE)	(1.43)	(1.79)		(2.38)	(2.06)		(1.42)	(1.81)		(2.16)	(3.14)		
	ES	+.26			+.20			+.31			-1.31			-.14
M	ES	+.17			+.29			+.38			-1.16			-.08
	N	81	52		36	47		72	44		38	19		
Low 33%														
Pretest Math	M	28.14	30.37	5.06*	14.75	32.80	0.75	26.63	23.37	1.37	26.22	26.29	18.35***	
	(SD)	(5.81)	(8.91)		(14.88)	(5.26)		(8.41)	(14.80)		(8.51)	(6.40)		
Posttest Math	Adj. M	25.85	43.51		38.93	59.58		40.28	34.26		11.43	36.73		
	(SE)	(5.70)	(5.33)		(5.16)	(8.62)		(.551)	(3.72)		(3.91)	(4.43)		
	ES	-.93			-.52			+.59			-1.47			-.58
Pretest Reading	M	19.14	26.50	2.33	15.58	28.20	0.13	18.49	28.49	0.82	32.56	29.71	10.28**	
	(SD)	(8.86)	(5.78)		(10.78)	(15.88)		(17.40)	(7.62)		(5.41)	(13.15)		
Posttest Reading	Adj. M	28.30	38.86		27.60	30.55		41.15	36.96		15.13	34.54		
	(SE)	(4.78)	(4.44)		(4.17)	(6.76)		(3.06)	(3.25)		(3.98)	(4.52)		
	ES	-.84			-.22			+.48			-1.28			-.47
M	ES	-.89			-.37			+.54			-1.38			-.53
	N	7	8		12	5		9	8		9	7		

Note. CK = Core Knowledge, ES = Effect Size.
*** $p < .001$ ** $p < .01$ * $p < .05$.

Table 16: Summary of Core Knowledge Effects on Core Knowledge Test Outcomes, Third-through-Fifth-Grade Cohort

Third through		Florida			Texas			Maryland			All Schools
Fifth Grade		CK	Control	F	CK	Control	F	CK	Control	F	ES
Wilks's Lambda		0.71		18.91***	0.89		3.07*	0.87		2.67	
All Students											
Pretest LA	M	.28	.01	18.55***	-.56	-.44	7.477**	-.82	-.70	1.19	
	(SD)	(.99)	(.97)		(1.02)	(.67)		(1.08)	(.75)		
Posttest LA	Adj. M	.36	-.22		.46	-.14		-.39	-.62		
	(SE)	(.08)	(.11)		(.17)	(.13)		(.12)	(.17)		
	ES	+.69			+.60			+.29			+.53
Pretest SC	M	-.07	.32	75.45***	-.16	-.48	11.18**	-.83	-.76	1.68	
	(SD)	(.94)	(.85)		(1.07)	(.71)		(.79)	(.52)		
Posttest SC	Adj. M	.74	-.49		-.07	-.63		-1.07	-.84		
	(SE)	(.08)	(.11)		(.13)	(.10)		(.10)	(.15)		
	ES	+1.12			+.65			-.35			+.47
Pretest SS	M	.38	-.43	9.55**	.08	-.91	4.45*	-.64	-.71	1.69	
	(SD)	(1.01)	(.72)		(1.13)	(.69)		(.84)	(.57)		
Posttest SS	Adj. M	-.08	-.48		-.11	-.47		-.69	-.92		
	(SE)	(.07)	(.10)		(.13)	(.10)		(.10)	(.15)		
	ES	+.48			+.47			+.33			+.43
M	ES	+.76			+.57			+.09			+.48
	N	97	48		31	51		42	21		

Note. ES = Effect Size, CK = Core Knowledge.
LA = Language Arts, SC = Science, SS = Social Studies.
*** $p < .001$, ** $p < .01$, * $p < .05$.

Table 16 (cont.)

Third through Fifth Grade		Florida			Texas			Maryland			All Schools
		CK	Control	F	CK	Control	F	CK	Control	F	ES
Low 33%											
Pretest LA	M	-1.20	-1.46	0.18	-1.52	-.93	3.59	-1.47	-1.25	0.06	
	(SD)	(.48)	(.42)		(.62)	(.42)		(.66)	(.50)		
Posttest LA	Adj. M	-.22	-.39		.56	-.31		-.47	-.57		
	(SE)	(.20)	(.36)		(.38)	(.21)		(.22)	(.36)		
	ES	+.27			+1.00			+.12			+.46
Pretest SC	M	-1.40	-1.46	8.75*	-1.50	-1.11	0.59	-1.24	-1.07	2.23	
	(SD)	(.47)	(.42)		(.49)	(.51)		(.53)	(.40)		
Posttest SC	Adj. M	.26	-1.32		-.54	-.79		-1.27	-.81		
	(SE)	(.27)	(.46)		(.28)	(.16)		(.16)	(.26)		
	ES	+1.40			+.39			-.71			+.36
Pretest SS	M	-1.25	-1.75	2.29	-1.34	-1.33	0.44	-1.28	-1.26	2.07	
	(SD)	(.59)	(.66)		(.53)	(.60)		(.52)	(.42)		
Posttest SS	Adj. M	-.53	-1.17		-.67	-.51		-.93	-1.20		
	(SE)	(.20)	(.36)		(.20)	(.12)		(.10)	(.15)		
	ES	+.92			-.31			+.69			+.43
M	ES	+.86			+.36			+.03			+.42
	N	12	4		6	17		15	6		

Note. ES = Effect Size, CK = Core Knowledge.
LA = Language Arts, SC = Science, SS = Social Studies.
*** $p < .001$, ** $p < .01$, * $p < .05$.

Summary of Third-through-Fifth-Grade-Cohort Results

Figure 14 summarizes the third-through-fifth-grade-cohort Core Knowledge effect size estimates for each of the outcomes. Each of the three effect sizes for the Core Knowledge test outcomes is educationally meaningful. However, similar to the outcomes for first-through-third-grade students, the effect sizes for the norm-referenced reading and math outcomes are close to zero. These results may be interpreted very much like the first-through-third-grade results: Core Knowledge students learned more advanced language arts, science, and social studies topics and skills than did their nonparticipating peers, and they learned about as much about basic-skills-oriented math and reading topics.

Figure 19 plots the correlations between level of implementation and norm-referenced math and reading gains. These plots illustrate strong correlations between level of implementation and effect size for both outcome measures. Excluding schools in which less than 50% of the classroom teachers implemented Core Knowledge, Figure 15 shows effect size increases over those summarized in Figure 14 for all outcomes. Large increases are especially evident for the norm-referenced reading and math scores and for the Core Knowledge science test scores. The relationship between level of implementation and Core Knowledge effects also is summarized by Figure 18, which presents the effect sizes by school. The low-implementing Maryland site posted relatively poor outcomes in comparison to the other Core Knowledge sites. This is especially evident when one compares effects on the norm-referenced outcome measures.

Although stronger Core Knowledge implementations are related to improved Core Knowledge achievement test outcomes for both grade cohorts, the third-through-fifth-grade results contrast the findings for first graders in that higher levels of Core Knowledge implementation in the later elementary grades appear to have a more profound influence on students' basic skills learning.

Figures 16 and 17 summarize the potential equity effects associated with Core Knowledge implementation. The figures display the effect sizes for third-grade students who began the study with pretest scores in the bottom 33% of the distribution. The Core Knowledge test outcomes for third-through-fifth-grade low achievers are similar to those found for first-through-third-grade low achievers in that the effects of Core Knowledge on low achievers were about the same as the effects on all Core Knowledge students. However, in this case, low-achievers' outcomes on the norm-referenced reading and math outcomes were considerably worse than those for Core Knowledge students in general. These results for the norm-referenced outcomes contrast the findings for the first-through-third-grade cohort. This lack of consistency may be explained by the small samples involved in the analyses of low-achievers' test scores.

Conclusions: Quantitative Analyses

The quantitative analyses of student outcomes revealed three prominent themes. First, the analyses of student outcomes on the Core Knowledge Achievement subtests indicated that the reform had educationally meaningful impacts. However, analyses of the Core Knowledge students' scores on norm-referenced, basic-skills achievement tests did not reveal substantially better outcomes than those for students from comparison schools, except for the third-through-fifth-grade cohort in high-implementing schools as noted below. It might be inferred that the better relative performance by the later Core Knowledge cohort on normed tests could be explained by the cumulative effect of a content-focused curriculum on general academic skills. Since the normed tests are not tied to a particular curricular sequence, the cumulative effects of carefully sequenced content would be more likely to exhibit themselves in later grades, as a gradual result over several grades.

Second, the correlation between level of implementation and effect size indicates that when schools implemented the Core Knowledge sequence with greater reliability and consistency, students achieved improved outcomes on all tests. Considering only those schools in which the research staff observed Core Knowledge curriculum and instruction in more than 50% of the classrooms, one sees marked increases in the effect size estimates favoring Core Knowledge. Among first-through-third-grade students, improved implementation was related to substantially higher Core Knowledge test outcomes. The results for third-through-fifth-grade students suggest that higher levels of implementation were associated with larger, educationally meaningful effects on the norm-referenced tests, and on the Core Knowledge tests.

Finally, although the analyses of the potential equity effects associated with Core Knowledge implementation were based on small samples of students, they are suggestive in two ways. When one considers the outcomes on the Core Knowledge tests, relative to their control counterparts, the low-achieving Core Knowledge students hold learning advantages that are about the same as those enjoyed by all Core Knowledge students. In other words, the Core Knowledge equity effects are similar to the overall Core Knowledge effects. In contrast, low-achievers' outcomes on the norm-referenced tests revealed Core Knowledge equity effects that were both stronger (for the first-through-third-grade cohort) and weaker (for the third-through-fifth-grade cohort) than overall Core Knowledge effects. These mixed results for the norm-referenced outcomes suggest an important area for future research on larger samples of low achievers.

Figure 14: Core Knowledge Effect Sizes for the Third-through-Fifth-Grade Cohort by Test

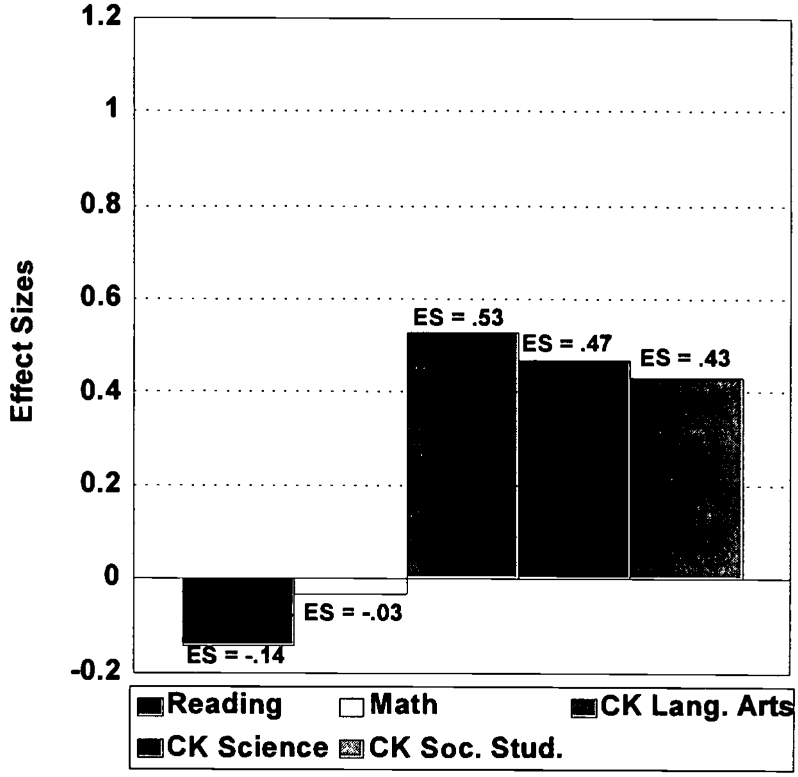


Figure 15: Core Knowledge Effect Sizes for the Third-through-Fifth-Grade Cohort for Schools with Implementation Rates Greater than 50%

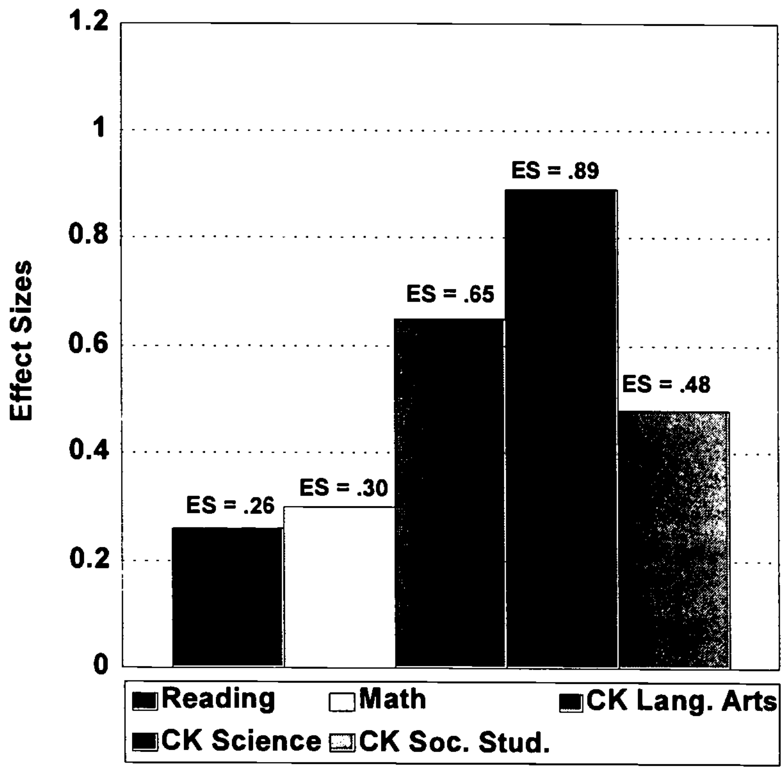


Figure 16: Core Knowledge Effect Sizes for Low-Achieving Students in the Third-through-Fifth-Grade Cohort by Test

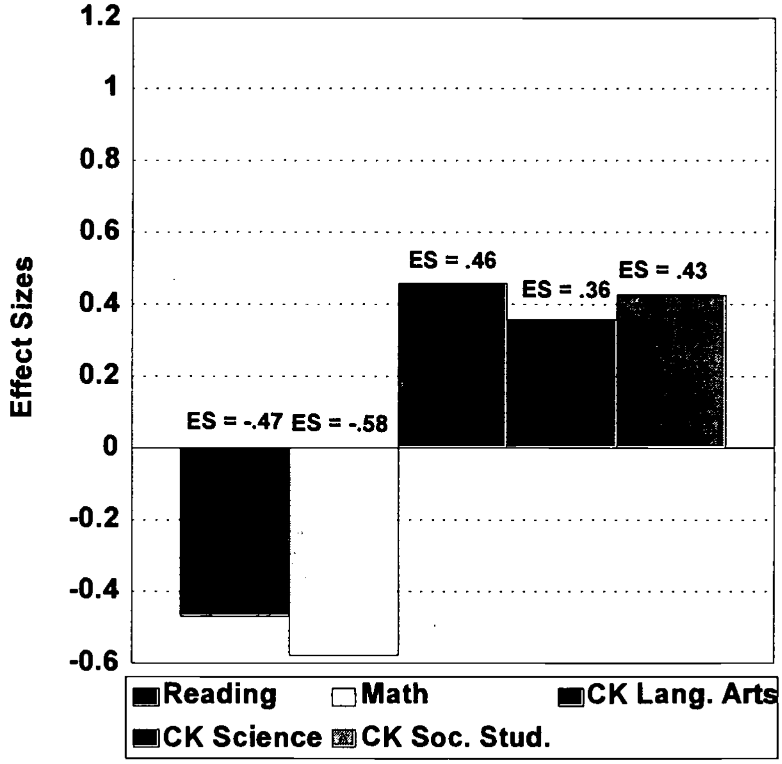


Figure 17:Core Knowledge Effect Sizes for Low-Achieving Students in the Third-through-Fifth-Grade Cohort for Schools with Implementation Rates Greater than 50%

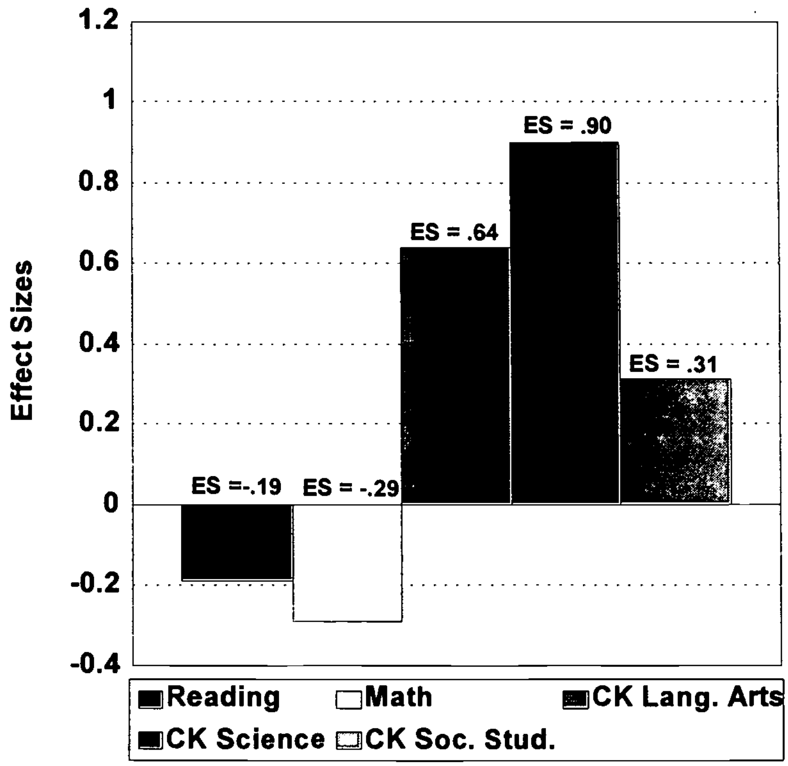


Figure 18: Core Knowledge Effect Sizes for the Third-through-Fifth-Grade Cohort by Test, by School

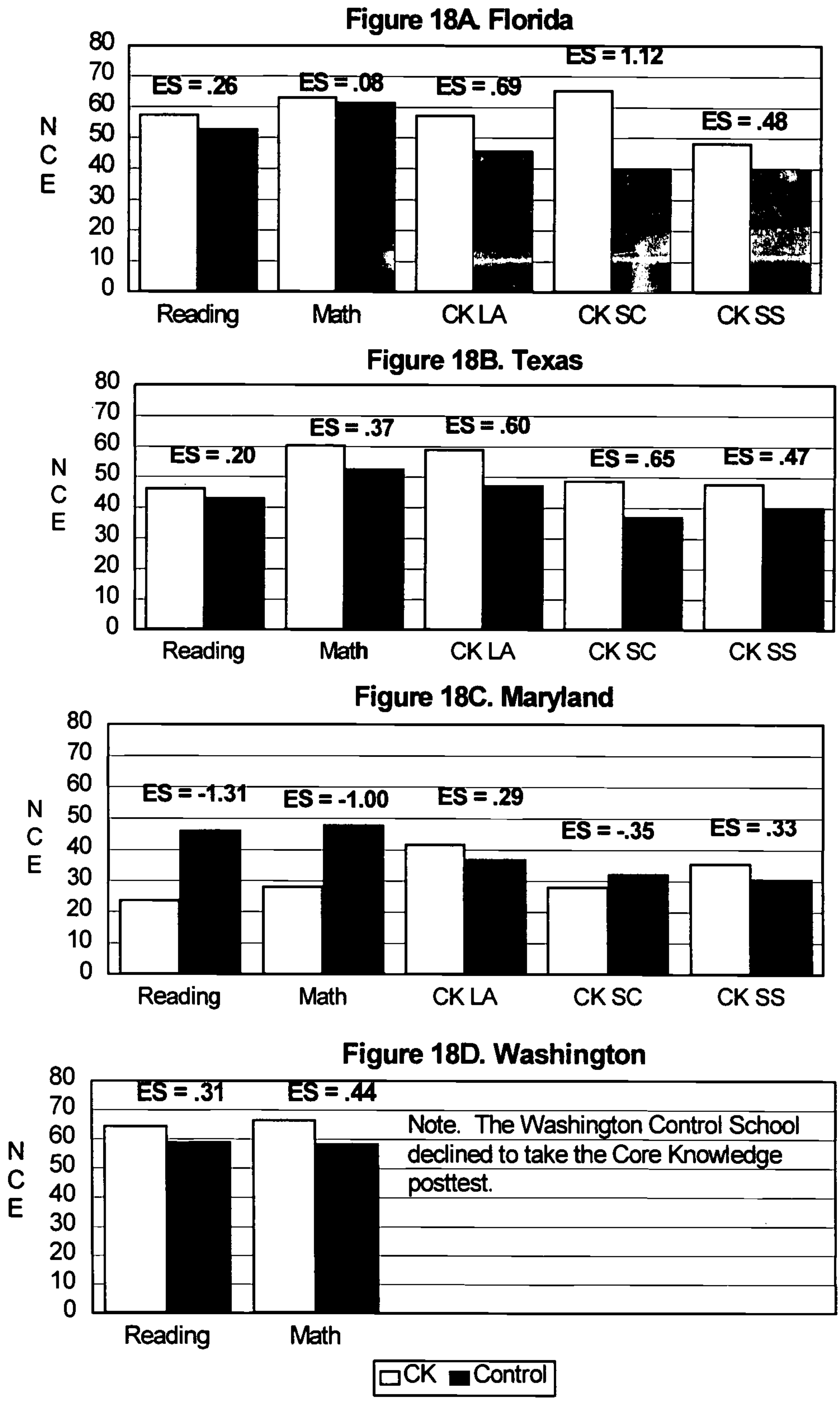
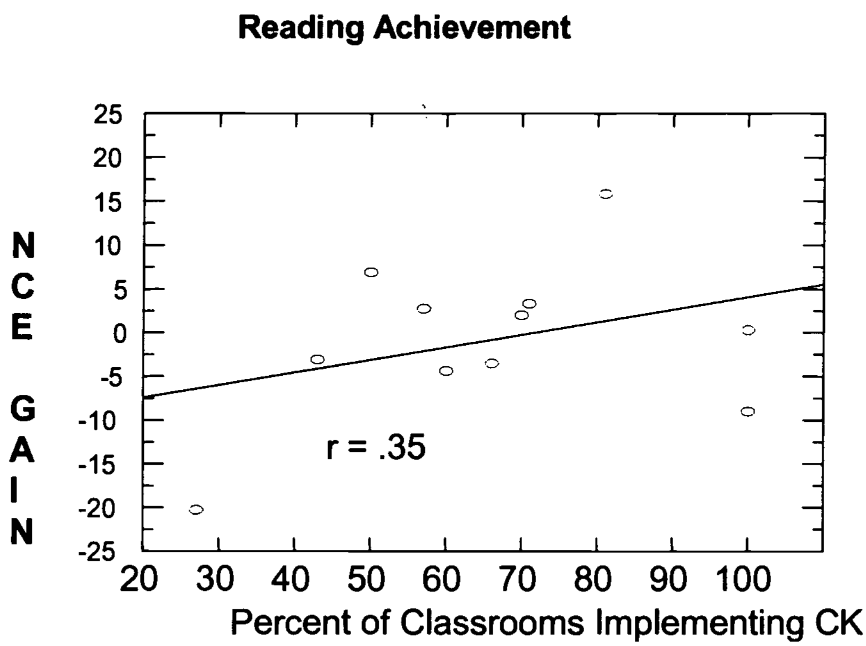
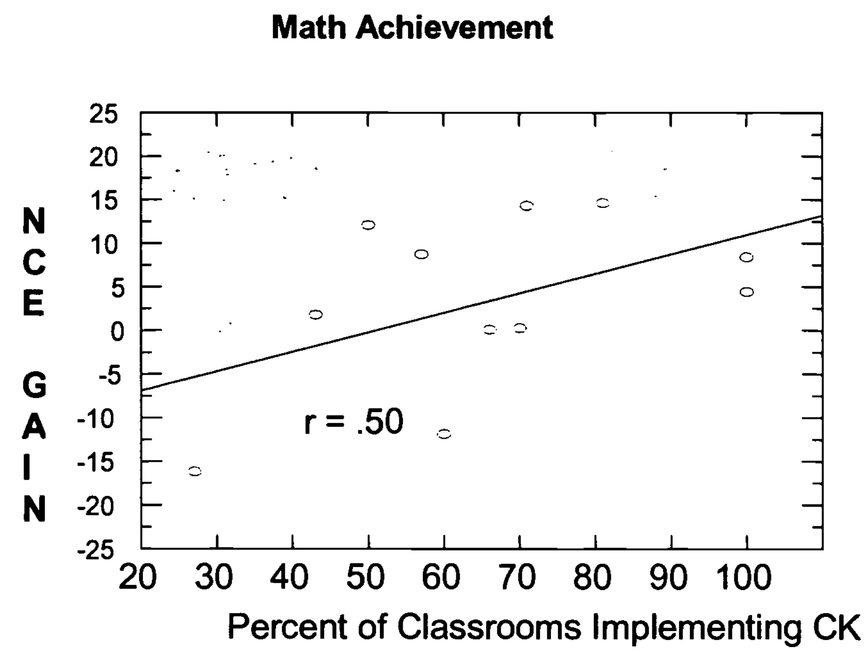


Figure 19: Effect Size by Level of Implementation for the Third-through-Fifth-Grade Cohort





D. Attendance Outcomes

Attendance is another outcome measure we examined in the national evaluation of Core Knowledge implementation. We collected data on student attendance in all Core schools and control schools over the three-year period of the study, 1995-1998. Table 17 shows average daily attendance (ADA) percentages for each school over time (1995-1998).

Table 17: Attendance Data

School	1995-96	1996-97	1997-98	Mean	3 yr. Gain (Loss)
Woodlands (FL) Adv.	94.9	95.8	95.3	95.3	0.4
FL Control	95.2	N/A	94.9	95.1	(0.3)
Englewood (TX) Adv.	97.1	97.1	96.7	97	(0.4)
TX Control	97	97	97	97	0
Garvey (MD) Adv.	93.0	94.3	95.4	94.2	2.4
MD Control	95	96	96.7	95.9	1.7
High Country (WA) Adv.	97	97	97	97	0
WA Control	95	95	95	95	0
Peabody (CO) Adv.	96.3	96.2	96.3	96.3	0
Smithtown (OH) Adv.	95.6	93.7	94.8	94.7	(0.8)
Alder (FL) New	94.4	95.7	95.4	95.2	1.0
Riverside (TX) New	96.7	96.9	96.8	96.8	0.1
Colonial (MD) New 1	95.1	96.6	93.9	95.2	(1.2)
Vine (MD) New 2	96.2	96	96.5	96.2	0.3
Newton (CO) New	97.1	96.4	95.3	96.3	(1.8)
Carson (TN) New	96	96	96	96	0

This table shows that Core Knowledge implementation has not significantly impacted student attendance outcomes in this study. Garvey and Alder are the only two Core Knowledge schools that experienced noticeable gains in attendance over time. In addition, while the gain for Garvey was significant, an attendance gain was also present in the Maryland control school (and the attendance rate at the end of three years was higher overall). The gains achieved by Woodlands, Riverside, and Vine were very small. In most Core Knowledge schools, attendance remained constant or dropped by an insignificant amount. Attendance rates at Smithtown and Colonial dropped slightly. High Country Elementary (an advanced site) sustained a two percentage point attendance advantage over its matched control site, but in other pairs, differences were negligible.

V. Individual Case Studies of Implementation

In the following section, we provide individual case studies of each Core Knowledge school in our study sample. These cases provide detailed information on how Core Knowledge originated and was implemented in each school, as well as data on student outcomes at each site. Where applicable, we provide outcome data on matched control schools.

A. Advanced Implementation Sites

Woodlands Elementary School (FLORIDA)

Location: Suburban area

Student population:	922 students in Grades K-5		
	Ethnic breakdown:	82.4%	White
		11.9%	African American
		4.7%	Latino
		1%	Other
	Free- or reduced-price lunch:	31%	
	Limited English Proficient:	3%	

Special features: The school opened in 1988. The principal chose the teachers.

Adoption of Core Knowledge: The principal at Woodlands attended the first "Cultural Literacy" conference in 1990, where some of the development of the Core Knowledge Sequence took place. She brought the Sequence back to her staff and, after debate and discussion, the Woodlands faculty agreed to experiment with teaching it, beginning in 1990-91. Woodlands thus became one of the first Core Knowledge schools.

Progress of Core Implementation: In 1990-91, Woodlands piloted the Core Knowledge Sequence. At this stage, the Sequence itself was still evolving. By 1992-93, teachers had reached a *high* level of implementation that continued through the 1997-98 school year, though some speculated that less time was being spent on Core due to other pressures.

Mean percentages of overall CK content items taught or planned by regular classroom teachers (1997-98): Grade 3: 81%
Grade 5: 87%

Percentage of 2nd and 4th grade classrooms observed exhibiting Core content (1996-97): 79%

Percentage of 3rd and 5th grade classrooms observed exhibiting Core content (1997-98): 70%

Factors impacting Core Implementation: To prepare for implementation, the principal formed a Core Knowledge committee to develop the scope and sequence and coordinate implementation activities. This committee, which included the principal and teachers from all grade levels, and the art and music teachers, met bi-weekly in the summer before implementation and weekly thereafter. All teachers received copies of a month-by-month scope and sequence, developed by the committee, before the 1990-91 school year began (Jones, 1991).

Woodlands spent approximately $16,000 in the first year on resources for Core Knowledge. This funding came from a state school improvement grant, the PTA budget, and the school's discretionary budget. Since the first year, they have relied primarily on the same funding sources to purchase Core Knowledge materials. A small grant from a private foundation provided release time for teachers to incorporate revisions to the Sequence in 1995. Teachers fundraise in order to attend the annual conference.

The Core Knowledge Sequence, as currently written, was developed in part through the experience of teachers at Woodlands. The school's implementation experience is documented in *A School's Guide to Core Knowledge* (Jones, 1991). In 1995, the principal who brought Core Knowledge to the school took a position at the Core Knowledge Foundation, and the former assistant principal was appointed principal of Woodlands.

Woodlands continues to have contact with the Core Knowledge Foundation. Many long-time teachers at Woodlands are very strong believers in Core, and some of them travel to give presentations to interested schools. The school has a very positive national and local reputation. Visitors from around the country, including news reporters and interested educators, are a common sight at Woodlands.

The master schedule was put together based on teachers' needs regarding Core Knowledge. Teachers at each grade level have 45 minutes of common planning time each day; however, they typically meet as a team only once a week. Some felt that this was insufficient and wished that they also had staff development days devoted to Core planning. Subjects are departmentalized or teachers rotate to teach Core topics to various classes within some grade levels at Woodlands.

The school uses a mostly thematic, hands-on, project-based approach to teaching Core. Although lesson plans for Core units have been fully developed over the years, teachers continue to make changes. One teacher explained, "I see the Core Knowledge Sequence as a living, breathing document." Over time, teachers have been able to integrate skills teaching into Core. A teacher remarked: "Core is everything we do." A curriculum/technology coordinator serves as a resource for teachers, and Woodlands is fully networked with computers in each classroom and an elaborate media center geared toward Core Knowledge. Each grade also has their own Core Knowledge storage room, where resources are housed. Woodlands began involving parents at the very beginning of implementation through newsletters, culminating activities, and presentations. They also publish a Core Knowledge-focused school calendar.

To keep the enthusiasm for Core alive, the school has held summer institutes for new and returning teachers. The teachers also try to attend the annual Core conferences as much as possible. As one teacher stated, "The conferences are a really big help to keep it going." Still, some of the experienced teachers who had been there when Core began were concerned that enthusiasm for Core had waned. Some thought this was related to the turnover in administration and teaching staff. By 1998, only 13 of the current 53 faculty were at Woodlands when Core began.

A number of the 33 other elementary schools in the county adopted Core Knowledge because of the successes at Woodlands. Yet the district has not been explicitly supportive of Core Knowledge, mainly because they do not see it as their own. In fact, in 1997, the district developed their own core curriculum standards, some of which overlapped with Core, but which were more general. Teachers at Woodlands began to feel pressures related to new pushes for standards and accountability. The school's Core Knowledge committee was working to integrate the district and state curriculum standards into the scope and sequence. In addition, the school recently adopted the HBJ reading program for the primary grades and Reading Renaissance for the upper grades in order to reach a new state and district goal of all students reading on grade level by the end of third grade. As one teacher stated: "All of these things are...taking teachers' time away from Core Knowledge." The district's move toward controlled choice may also impact the school population in the coming years. Still, despite these new additional pressures, Core Knowledge is very much institutionalized at Woodlands and is virtually certain to continue.

Table 18 provides detailed achievement and attendance data for Woodlands and its comparison school. All of the achievement data are presented using the Normal Curve Equivalent (NCE) scale.[11] Data in Table 18 indicate that the 84 Woodlands students with complete CTBS/4 Reading Comprehension test data for the spring of first grade began the study at a relatively high level of achievement (mean reading NCE pretest = 58.1, or about the 66th percentile). In the spring of 1998, when those 84 students had become third graders, they achieved a slight gain on the CTBS (mean NCE = 59.2, or about the 68th percentile, and a one NCE gain).

The same Woodlands group began first grade with an even higher mean level of mathematics knowledge (NCE = 65.5, or about the 76th percentile). The group ended third grade with a mean NCE of 67.0 (about the 79th percentile), for a 1.5 NCE gain in mathematics concepts and applications as measured against national norming samples.

Woodland's cohort of students who were in third grade in the fall of 1995 and in fifth grade in the spring of 1998 followed a similar trajectory. The group-mean CTBS Reading Comprehension score was an NCE of 55.1 in the fall of third grade, and that rose two NCEs to 57.2 in the spring of fifth grade. Math Concepts and Applications rose from 64.8 to 65.1, or a gain of 0.3 NCEs.

Interestingly, the third graders scored somewhat above the average on the Core Knowledge Language Arts, Science, and Social Studies subtests in the spring of third grade, and further above average in the spring of fifth grade on Language Arts and Science.[12] There was a decline in performance on the Social Studies subtest with an NCE loss of 7.5. Overall, those data indicate that, in addition to making gains in the basic skills, the students were advancing more rapidly than average in Core Knowledge content areas.

The three-year mean student attendance rate for Woodlands was 95.3%.

The matched control school for Woodlands produced some clear contrasts. As at Woodlands, fall of first grade reading scores were above the national average (mean NCE = 52.5) but that mean dropped 6.7 NCEs by the spring of third grade, to 45.8. Math began above the national average and gained one NCE over two and a half years.

As with the first-through-third-grade cohort, the control school's third-through-fifth-grade cohort began the study with above-average reading scores and then dropped an average of 3.5 NCEs by the spring of fifth grade. The control group's mean math score rose an average of 0.8 NCEs, from 58.4 to 59.1. Not surprisingly, the control school fell further behind Woodlands over time on the Core Knowledge test.

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[11] The NCE scale is a normalized standard score metric, matching the percentile distribution at values of 1, 50, and 99, with a mean of 50 and a standard deviation of 21.06 (Tallmadge & Wood, 1981).

[12] The Core Knowledge subtests were calculated in standard deviation units (z-scores). To aid in comparison of the Core Knowledge subtests with the achievement tests, the z-scores were converted to NCEs so that all tests would be in the same metric. Under the SD column, the original z-score and its standard deviation are presented.

Woodlands presents a case of a relatively strong implementation of Core Knowledge in which both students' basic skills and Core Knowledge competencies increased over the three years of the study.

Table 18: Woodlands (FL) Test and Attendance Results

First-through-Third-Grade Cohort	N	Pretest Mean	(SD)	Posttest Mean	(SD)	Gain (loss)
Reading Achievement	84	58.1	(15.9)	59.2	(15.6)	1.1
Mathematics Achievement	84	65.5	(21.6)	67.0	(16.5)	1.5
Core Test: Lang. Arts	140			54.8	(.23; .80)	
Core Test: Science	140			53.2	(.15; .77)	
Core Test: Social Studies	140			55.3	(.25; .74)	
Third-through-Fifth-Grade Cohort						
Reading Achievement	82	55.1	(22.7)	57.2	(17.7)	2.1
Mathematics Achievement	81	64.8	(19.7)	65.1	(20.2)	0.3
Core Test: Lang. Arts	97	55.9	(.27; .99)	57.5	(.38; .74)	1.6
Core Test: Science	97	48.9	(-.07; .94)	64.2	(.70; .81)	15.3
Core Test: Social Studies	97	57.5	(.38; 1.01)	50.0	(.01; .80)	-7.5
Three-Year Mean School Attendance Rate:			95.3			

Matched Control School (FL) Test and Attendance Results

First-through-Third-Grade Cohort	N	Pretest Mean	(SD)	Posttest Mean	(SD)	Gain (loss)
Reading Achievement	21	52.5	(16.7)	45.8	(21.0)	-6.7
Mathematics Achievement	21	54.7	(24.7)	55.8	(23.3)	1.1
Core Test: Lang. Arts	41			46.8	(-.16; .75)	
Core Test: Science	41			46.3	(-.19; .88)	
Core Test: Social Studies	41			40.7	(-.46; .68)	
Third-through-Fifth-Grade Cohort						
Reading Achievement	50	67.6	(20.9)	64.1	(19.6)	-3.5
Mathematics Achievement	52	58.4	(23.0)	59.1	(19.2)	0.7
Core Test: Lang. Arts	48	50.0	(.01; .97)	44.7	(-.26; .89)	-5.3
Core Test: Science	48	56.4	(.32; .85)	41.9	(-.40; .90)	-14.5
Core Test: Social Studies	48	41.3	(-.43; .72)	35.8	(-.68; .63)	-5.5
Three-Year Mean School Attendance Rate:			95.1			

Englewood Elementary School (TEXAS)

Location: Low-income community

Student population: 487 students in Grades K-5

Ethnic breakdown:	85%	Latino
	6%	Black
	8%	White
	1%	Asian
Free- or reduced-price lunch:	96%	
Limited English Proficient:	16%	

Special features: Englewood is a year-round school.

Adoption of Core Knowledge: In 1992, faculty from the education department of a local university approached the staff at Englewood about trying Core Knowledge. The university offered to provide assistance in implementation, which included connecting the school with grant sources. The teachers established consensus in favor of adoption, believing that the curriculum they were using at the time "wasn't motivating students."

Progress of Core Implementation: Englewood began partial implementation of the Core Knowledge Sequence in the 1992-93 school year, beginning mostly in the lower grades. By 1995-96, teachers in all grades felt that they were teaching almost all topics. In 1996-97, the implementation of Core dropped slightly. In 1997-98, implementation was at a *moderate-high* level.

Mean percentages of overall CK content items taught or planned by regular classroom teachers (1997-98): Grade 3: 73%
Grade 5: 96%

Percentage of 2nd and 4th grade classrooms observed exhibiting Core content (1996-97): 60%

Percentage of 3rd and 5th grade classrooms observed exhibiting Core content (1997-98): 71%

Factors impacting Implementation: More than 20 teachers from Englewood attended the first Core Knowledge conference in Florida and visited Woodlands before beginning implementation. Teachers had three months (a summer) to prepare for Core Knowledge implementation, which included three weeks of paid planning time. Through creative scheduling, grade level teachers now had 45 minutes of common planning time every day.

Englewood's strong partnership with the university facilitated implementation of Core Knowledge initially and over time. Englewood's partnership with the university also resulted in a $1.2 million grant from a local foundation to support professional development. Since Englewood is a professional development site, classes for the teaching interns are held at the school site, involving the participation of Englewood master teachers and university faculty. The school often hires new teachers who have been university interns. The school also had a state grant for restructuring that paid for staff development and materials for Core. Despite these funds, some teachers reported spending a large amount of time and money gathering resources for Core.

The local YMCA has an office and a full-time staff member on the school campus, paid through Title I funding. The YMCA coordinator arranges Core Knowledge-focused field trips for students. The school also has a strong parent involvement initiative, which they began to implement in tandem with Core Knowledge. "Share the Success" days are held and parents are frequently informed about what is being taught and are invited to attend field trips. Finally, the school has a full-time "instructional guide" whose job it is, as she explained, "to be there for the teachers and the children. [The instructional guide] gathers resources, orders materials, and [she goes] into the classroom to help them adjust their practices and model."

Englewood uses a combination of phonics and whole language, and a literature-based approach organized around Core to teach reading. In 1996-97, Englewood adopted the Chicago Math curriculum. By and large, the teachers believe in theories of multiple intelligences and the existence of diverse learning styles, as well as subject integration approaches that they believe enhance, and are enhanced by, Core Knowledge. Core material is taught in Spanish in the bilingual classes at each grade level.

The school has a moderate to high amount of contact with the Core Knowledge Foundation. A group of 6-10 teachers from Englewood attend the conference every year. Core Foundation staff have visited the school, and staff from Englewood give workshops to schools considering adoption. The staff is also active in local Core Knowledge networks organized by the university.

The district has allowed Englewood to engage in site-based management (particularly with regard to resources and scheduling), which has facilitated Core implementation. However, district support for Core Knowledge has not been strong, and the district recently pressured Englewood to adopt the Modern Red Schoolhouse reform design (Heady & Kilgore, 1996), as the district was engaged in a scale-up of New American Schools (Kearns & Anderson, 1996). The staff at Englewood was not in favor of the Modern Red Schoolhouse model. As a result, they had to submit documentation of their school design to the district for approval, a process that took much time and effort. In addition, the teachers felt increasing pressure to prepare students for the state-mandated assessment tests.

The school has experienced some instability of leadership over the years. The former principal of Englewood, who was at Englewood at the time the school adopted Core, retired in 1995. She was replaced by a principal who led the school from 1995-1998. A third principal assumed leadership in 1998-99. Despite these leadership changes and district pressures, it seems that the strong teacher commitment to Core and the stability and support of the university and YMCA ensure that Core will continue to be a feature of Englewood for the years to come. "Core...is a normal part of life on this campus," stated a teacher.

Table 19 provides, in detail, information on achievement and attendance for Englewood and its comparison school. Data in Table 19 indicate that the 39 students at Englewood with complete CTBS/4 Reading Comprehension test data for the spring of first grade began the study at a relatively low level of achievement (mean reading NCE pretest = 29.4, or about the 16th percentile). In the spring of 1998, those students experienced a gain of 11.2 NCEs on the CTBS/4 (mean NCE = 40.6, or about the 32nd percentile).

Those same Englewood students began first grade with a slightly lower mean level for math (NCE = 26.4, or about the 13th percentile). The group ended third grade with a mean NCE of 41.9 (the 35th percentile), for a 15.5 NCE gain in Mathematics Concepts and Applications as measured against national norming samples.

Table 19: Englewood (TX) Test and Attendance Results

First-through-Third-Grade Cohort	N	Pretest Mean	(SD)	Posttest Mean	(SD)	Gain (loss)
Reading Achievement	39	29.4	(19.1)	40.6	(18.0)	11.2
Mathematics Achievement	39	26.4	(18.0)	41.9	(18.0)	15.5
Core Test: Lang. Arts	61			44.7	(-.27; .99)	
Core Test: Science	60			50.0	(.01; .90)	
Core Test: Social Studies	60			48.4	(-.08; 1.11)	
Third-through-Fifth-Grade Cohort						
Reading Achievement	36	39.1	(22.8)	53.4	(22.6)	14.3
Mathematics Achievement	37	39.2	(22.2)	42.5	(16.4)	13.3
Core Test: Lang. Arts	31	38.3	(-.56; 1.02)	59.3	(.45; 1.06)	21.0
Core Test: Science	31	46.8	(-.16; 1.07)	50.0	(.01; 1.01)	3.2
Core Test: Social Studies	31	51.6	(.08; 1.13)	51.6	(.08; .99)	0.0
Three-Year Mean School Attendance Rate:			96.9			

Matched Control School (TX) Test and Attendance Results

First-through-Third-Grade Cohort	N	Pretest Mean	(SD)	Posttest Mean	(SD)	Gain (loss)
Reading Achievement	37	42.9	(15.8)	53.8	(17.5)	10.9
Mathematics Achievement	37	53.0	(17.0)	58.8	(17.3)	5.8
Core Test: Lang. Arts	73			29.9	(-.95; .97)	
Core Test: Science	73			39.0	(-.52; .78)	
Core Test: Social Studies	73			23.0	(-1.29; .71)	
Third-through-Fifth-Grade Cohort						
Reading Achievement	43	49.5	(17.8)	52.3	(17.1)	2.8
Mathematics Achievement	42	49.7	(22.2)	58.4	(14.6)	8.7
Core Test: Lang. Arts	51	40.7	(-.44; .67)	47.4	(-.13; .88)	6.7
Core Test: Science	51	40.1	(-.48; .71)	35.8	(-.67; .62)	-4.3
Core Test: Social Studies	51	31.5	(-.91; .69)	37.7	(-.59; .47)	6.2
Three-Year Mean School Attendance Rate:			97.0			

Englewood's cohort of students who were in third grade in the fall of 1995 and in fifth grade in the spring of 1998 followed a similar trajectory. The group-mean CTBS Reading Comprehension score was below average with an NCE of 38.3 (29th percentile) in the fall of third grade. By the spring of fifth grade, the group-reading comprehension mean had increased 14.3 NCEs to 53.4 (56th percentile). Math concepts and applications followed a similar pattern increasing from 39.2 to 42.5, a gain of 13.3 NCEs.

The third graders scored somewhat below average on two of the three Core Knowledge subtests (Language Arts and Science) and average on Social Studies in the spring of third grade. Their scores for language arts and science increased in the spring of 1998 becoming comparable with the mean score for Social Studies. The data indicate that student performance on the Core Knowledge Language Arts subtest was somewhat consistent with performance on math and reading achievement.

The three-year mean student attendance rate for Englewood was 96.9%.

Overall, the matched control school students did much better on reading and math achievement at both time points. Unlike at Englewood, the fall of first grade reading scores were close to national average (mean NCE = 42.9). By the spring of third grade, students in the control school experienced a 10.9 NCEs increase to 53.8. Math began slightly above the national average (53.0 NCEs) and increased slightly by the spring of fifth grade to 58.8 NCEs.

The control school's third-through-fifth-grade cohort began the study with average reading scores (49.5 NCEs) and increased about 6.7 NCEs by the spring of fifth grade. The group's mean math score rose an average of 8.7 NCEs, from 49.7 to 58.4.

While students in the control school performed better on the achievement tests in the spring of 1995 and the spring of 1998, Englewood students performed better on the Core Knowledge subtests in both the spring of 1995 and the spring of 1998.

Englewood presents a case of a relatively strong implementation of Core Knowledge. While control students outperformed Englewood students on achievement, Englewood students experienced an increase in both students' basic skills and Core Knowledge competencies over the three years of the study. The NCE gains made by the Englewood students were higher than those made by the control students on all subtests for each cohort.

Garvey Elementary School (MARYLAND)

Location: Low-income community

Student population:	450 students in Grades K-5		
	Ethnic breakdown:	98%	African-American
		2%	Latino
	Free- or reduced-price lunch:	63%	
	Limited English Proficient:	0	

Adoption of Core Knowledge: Garvey became a Core Knowledge school in 1994 after the principal applied for and received a grant for Core Knowledge implementation from a local foundation. Garvey was one of six schools in the state that received these grants. Evidence suggests that the principal was motivated by the grant money (more so than by the Core model itself), as the school had recently lost its Title I status and the funding that accompanied it.

Progress of Core Implementation: Garvey emerged early on as an enthusiastic implementer of Core Knowledge in 1994, and reportedly many visitors came to the school to observe Core Knowledge implementation. However, after just one year, implementation of Core began to wane and continued downward in subsequent years. By 1998, data confirmed that Core Knowledge implementation was *low*.

Mean percentages of overall CK content items taught or planned by regular classroom teachers (1997-98): Grade 3: 67%
Grade 5: 45%

Percentage of 2nd and 4th grade classrooms observed exhibiting Core content (1996-97): 60%

Percentage of 3rd and 5th grade classrooms observed exhibiting Core content (1997-98): 27%

Factors impacting Core implementation: The local foundation grant totaling $27,000 ($22,000 in Year 1; $5,000 in Year 2) allowed the principal to give teachers paid planning time in the summer before implementation and the opportunity to purchase materials to support Core. Funding was intended to also be used for team planning in the first year of implementation, though this did not occur at Garvey. Nevertheless, teachers initially reported being "very excited" by Core and subsequently working together to develop lesson plans, which included less dependence on textbooks and more activities for students. The students "came to school enthused about Core," according to a teacher.

However, by the second year (1995-96), the principal and staff expended less effort on Core implementation. The school's master teacher was intended to assist other teachers with Core, but did not have time to go into their classrooms, as she had her own teaching duties. By the time the grant funding ended that year, Core had not yet been institutionalized. The school had not made the transition to using its own funds, or seeking other grant sources, to help them implement Core Knowledge effectively.

Coincidentally, in the fall of 1995, Garvey was identified as low achieving on a new state-mandated performance assessment test and was placed under threat of being reconstituted by their state department of education. Visitors from the state and district staff were frequent, and both the principal and the teachers felt great pressure to raise test scores and comply with demands. Echoing the sentiments of many others at Garvey, one teacher stated, "We don't have as much flexibility this year because we are a reconstitution-eligible school because of the grades our kids did *not* get last year. We have to adhere more closely to the [district] curriculum." Teachers also needed to teach state-mandated activity-based lessons with which, according to them, Core "did not mesh easily." As a result, Core was placed on the back burner. Teachers believed that by abandoning Core, they might be able to raise students' test scores. District administrators reinforced this belief. Paradoxically, this was occurring in a state where the state superintendent of education very actively supports Core Knowledge.

The threat of reconstitution and the stigma that accompanied it continued throughout 1997-98, as low student performance persisted. It appeared that the principal had silently decided to abandon Core Knowledge, neither offering teachers support for implementation, nor providing leadership for the program. New teachers were not given instruction in how to teach Core Knowledge, nor were they even informed about it when hired. Funding was not available for teachers to attend the annual Core conference. Some teachers chose to teach a few favorite Core Knowledge lessons in social studies and the occasional poem or saying, but that was the extent of their use of Core Knowledge content. While student products dealing with Core topics were formerly evident around the school, they were now sparse. One vestige of Core implementation that was evident was that all teachers reportedly attempted to teach the same topics at the same time, producing consistency within grade levels, but Core was not the focus.

Adding to the list of constraints, teachers were also very concerned by a lack of school safety and increased discipline problems. In addition, at the end of the 1997-98 school year, the district mandated two new reading series — Open Court for Grades K-2 and Houghton Mifflin for Grades 3-5 — which Garvey teachers now needed to incorporate. In 1998, teacher morale appeared to be very low. Overall, this set of conditions greatly impeded Core Knowledge implementation, and it seems unlikely that Core will return to Garvey as a school-wide focus.

Table 20 provides, in detail, information on achievement and attendance for Garvey and its comparison school. Table 20 shows that the 47 students at Garvey with complete CTBS/4 Reading Comprehension test data for the spring of first grade began the study at a relatively low level of achievement (mean reading NCE pretest = 35.9, or about the 25th percentile). In the spring of 1998, those 47 students experienced a slight loss on the CTBS/4 (mean NCE = 32.9, or about the 20th percentile, a three NCE loss).

The same Garvey group began first grade with an even lower mean level of mathematics knowledge (NCE = 28.1, or about the 14th percentile). The group ended third grade with a mean NCE of 29.9 (about the 17th percentile), for a 1.8 NCE gain in Mathematics Concepts and Applications as measured against national norming samples.

Garvey's cohort of students who were in third grade in the fall of 1995 and in fifth grade in the spring of 1998 followed a similar trajectory. The group-mean CTBS reading comprehension score was relatively average with an NCE of 46.5 (43rd percentile) in the fall of third grade. By the spring or fifth grade, the group Reading Comprehension mean had dropped 20.3 NCEs to 26.2 (12th percentile). Math Concepts and Applications followed a similar course dropping from 45.0 to 28.8, or a loss of 16.2 NCEs.

As with the achievement tests, the third graders scored somewhat below average on all three of the Core Knowledge subtests in the spring of third grade. Their scores, although still below average, had increased 8.9 NCEs for Language Arts, 2.8 NCEs for Science, and 6.2 NCEs for Social Studies in the spring of 1998.

The three-year mean student attendance rate for Garvey was 94.2%.

The matched control school for Garvey produced both similarities and contrasts. Unlike at Garvey, reading scores in the fall of first grade were close to the national average (mean NCE = 42.8) but that mean dropped 4.6 NCEs by the spring of third grade, to 38.2. Math began below the national average (36.4 NCEs) and remained relatively the same in the spring of 1998 (36.7 NCEs).

The Maryland control school's third-through-fifth-grade cohort began the study with slightly higher reading scores (36.9 NCEs) and increased about 4.7 NCEs by the spring of fifth grade. The control group's mean math score rose an average of 0.8 NCEs, from 58.4 to 59.1. While students in the control school performed slightly better on the Core Knowledge subtests in the spring of 1995, they fell behind Garvey in the spring of 1998.

Garvey presents a case of a relatively weak implementation of Core Knowledge, in which students' basic skills decreased over time while Core Knowledge competencies increased slightly over the three years of the study.

Table 20: Garvey (MD) Test and Attendance Results

First-through-Third-Grade Cohort	N	Pretest Mean	(SD)	Posttest Mean	(SD)	Gain (loss)
Reading Achievement	47	35.9	(16.1)	32.9	(19.9)	-3.0
Mathematics Achievement	46	28.1	(18.9)	29.9	(20.9)	1.8
Core Test: Lang. Arts	41			34.4	(-.75; .95)	
Core Test: Science	41			27.2	(-1.10; .75)	
Core Test: Social Studies	41			32.3	(-.86; .85)	
Third-through-Fifth-Grade Cohort						
Reading Achievement	40	46.5	(12.0)	26.2	(16.4)	-20.3
Mathematics Achievement	38	45.0	(17.5)	28.8	(18.4)	-16.2
Core Test: Lang. Arts	42	33.0	(-.83;	41.9	(-.40; .83)	8.9
Core Test: Science	42	33.0	(-.82; .78)	35.8	(-.67; .62)	2.8
Core Test: Social Studies	42	31.5	(-.91; .69)	37.7	(-.59; .47)	6.2
Three-Year Mean School Attendance Rate:			94.2			

Matched Control School (MD) Test and Attendance Results

First-through-Third-Grade Cohort	N	Pretest Mean	(SD)	Posttest Mean	(SD)	Gain (loss)
Reading Achievement	19	42.8	(22.0)	38.2	(20.8)	-4.6
Mathematics Achievement	18	36.4	(17.9)	36.7	(21.2)	0.3
Core Test: Lang. Arts	25			35.1	(-.73; 1.01)	
Core Test: Science	25			31.5	(-.89; .76)	
Core Test: Social Studies	25			27.2	(-1.12; .49)	
Third-through-Fifth-Grade Cohort						
Reading Achievement	19	36.9	(10.3)	41.4	(13.5)	4.5
Mathematics Achievement	19	42.6	(18.3)	47.3	(16.4)	4.7
Core Test: Lang. Arts	21	35.8	(-.70; .75)	37.7	(-.61; .67)	1.9
Core Test: Science	21	34.4	(-.76; .52)	33.0	(-.83; .75)	-1.4
Core Test: Social Studies	21	35.1	(-.71; .57)	30.7	(-.93; .76)	-4.4
Three-Year Mean School Attendance Rate:			95.9			

Smithtown Elementary School (OHIO)

Location: Rural area

Student population:	500 students in Grades K-5	
	Ethnic breakdown:	100% White
	Free- or reduced-price lunch:	60%
	Limited English Proficient:	0

Special features: Smithtown is a K-8 school. The middle grades are currently piloting Core Knowledge.

Adoption of Core Knowledge: The superintendent believed that a strong foundation was lacking in the school's curriculum, and he thus brought Core Knowledge to Smithtown in 1993.

Progress of Core Implementation: After six months of planning and piloting lessons (during the school year), Smithtown began full implementation of Core Knowledge in Grades K-5 in the beginning of the 1993-94 school year. In 1995-1997, the school achieved a high level of Core Knowledge implementation, though there was some variation among grade levels and particular teachers. Continuing through 1997-98, the school maintained a *high* level of Core Knowledge implementation overall, although the teachers reported teaching less Core as a result of new state content standards.

Mean percentages of overall CK content items taught or planned by regular classroom teachers (1997-98): Grade 3: 93%
Grade 5: 85%

Percentage of 2nd and 4th grade classrooms observed exhibiting Core content (1996-97): 82%

Percentage of 3rd and 5th grade classrooms observed exhibiting Core content (1997-98): 100%

Factors impacting Core Implementation: The superintendent first introduced Core Knowledge to the principal and teachers of Smithtown by asking them to "try it and evaluate it as it goes on." Some veteran teachers were initially resistant, but most eventually became supporters. As the principal stated: "The teachers that got involved with it sold the program to other teachers."

Once teachers made the decision to implement Core, the superintendent garnered grants from numerous local foundations and the state, totaling over $125,000. This funding provided for the purchase of resources and professional development for teachers. As a result, any teacher who was interested could attend the Core conference (and other relevant workshops) and visit other Core schools. The school also now benefits from a well-stocked library that includes videos, and teachers have Core resources in their classrooms, as well as Internet access. One teacher said: "I've never been turned down on anything I wanted to buy." Teachers at each grade level also had 200 minutes of common planning time per week in the first several years.

Over the past 4 years, the superintendent has continued to be a very active supporter, providing workshops for teachers on Core Knowledge and working to facilitate successful implementation. "He's in and out of the building all the time," stated one teacher. The principal is supportive of Core and has made organizational changes in the school, such as releasing teachers from lunch duty to ensure that they had more common planning time. Overall, teachers are very supportive of Core and provide leadership for implementation as well. "Ninety percent are really happy with it," explained one teacher. Some are still not enthusiastic but comply with teaching Core, as it is a district expectation.

Teachers use hands-on activities and cooperative learning as their major methods to teach Core material. The teachers also developed a Core Knowledge test for each grade level that is administered each May. Teachers believe the school's whole-language, literature-based reading program complements Core, however they have since also integrated Saxon Phonics and the Saxon Math program, at the suggestion of the Core Knowledge Foundation. The teachers have been very pleased with it.

The school has a "great deal of interaction" with the Core Knowledge Foundation, explained the principal. Representatives from the Foundation have visited several times, the entire staff has attended the Core National Conference, and teachers and administrators from Smithtown provide assistance to new schools interested in Core. Smithtown is also piloting the Core Knowledge middle school curriculum in Grades 6-8 on the same campus.

The state school board association recognized Smithtown for its implementation of Core Knowledge as an "outstanding new program." Despite these implementation successes, students' scores on the state proficiency test had not risen since the implementation of Core, and Smithtown began to feel pressure from the state in 1997-98. This created additional pressure for teachers, as they were required to integrate the state content standards. The fact that test scores had not risen also fueled debate surrounding a new school board election. Core had also been targeted as part of this battle for not being textbook-oriented, even though most parents knew little about it, and the school has historically had low parent involvement. The superintendent thought that Core may also have been threatened because it was seen as his "brainchild." Nevertheless, the teachers and administrators at Smithtown remain very committed to Core and hope that they will be able to weather the current political storm and raise test scores.

Table 21 provides achievement and attendance data in detail for Smithtown. Outcomes in Table 21 show that the 52 first-through-third-grade students at Smithtown with complete reading achievement data (based on the California Achievement Test) began the study at a below-average level of reading achievement with a mean NCE of 39.9. Reading achievement remained relatively constant with a mean of 40.3 NCEs in the spring of third grade (based on the Comprehensive Test of Basic Skills).[13] Students' performance in math fared slightly better. The 53 first-through-third-grade students with complete math data experienced a 5.3 NCE gain in math achievement from a mean of 40.3 NCEs on the CAT in the spring of kindergarten to a mean of 45.6 NCEs on the CTBS/4 in the spring of third grade.

Smithtown's cohort of students who were in third grade in the fall also began the study at a below-average level of achievement for reading (n = 50; mean NCE = 41.6) and math (n = 55; mean NCE = 43.6) on the California Achievement Test. By the spring of fifth grade, the reading achievement mean had decreased to 32.6 (a loss of 14 percentile points from the 34th percentile to the 20th percentile). Math achievement increased to 52.0 NCEs (a 6.4 NCE gain) based on the CTBS/4 achievement test.

The third graders scored about average on all three of the Core Knowledge subtests. In the spring of third grade the means for Language Arts, Science, and Social Studies were 50.0 NCEs, 46.8 NCEs, and 57.5 NCEs, respectively. By the spring of fifth grade, performance had

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[13] Although the pretest and posttest means were based on separate tests, they do measure similar domains. By converting the outcomes from percentiles to NCE scores, we were able to express the achievement outcomes in the same metric.

dropped on all three subtests. There was a loss of 3.2 NCEs for Language Arts, 5.5 NCEs for Science, and 1.6 NCEs for Social Studies.

Table 21: Smithtown (OH) Test and Attendance Results

First-through-Third-Grade Cohort	N	Pretest Mean	(SD)	Posttest Mean	(SD)	Gain (loss)
Reading Achievement	52	39.9	(11.6)	40.3	(19.0)	0.4
Mathematics Achievement	53	40.3	(15.1)	45.6	(19.1)	5.3
Core Test: Lang. Arts	71			45.8	(-.21; .73)	
Core Test: Science	71			42.5	(-.37; .77)	
Core Test: Social Studies	71			54.8	(.24; .87)	
Third-through-Fifth-Grade Cohort						
Reading Achievement	50	41.6	(22.3)	32.6	(20.0)	-9.0
Mathematics Achievement	55	43.6	(18.9)	52.0	(18.9)	6.4
Core Test: Lang. Arts	49	50.0	(.02; .84)	46.8	(-.17; .69)	-3.2
Core Test: Science	49	46.8	(-.17; .81)	41.3	(-.43; .77)	-5.5
Core Test: Social Studies	49	57.5	(.38; .92)	55.9	(.30; .81)	-1.6
Three-Year Mean School Attendance Rate:			94.7			

The three-year mean student attendance rate for Smithtown was 94.7%.

Due to the absence of a matched-control group, a conclusive judgement about the efficacy of Core Knowledge at Smithtown cannot be made. The first-through-third-grade students did experience gains in both reading and math achievement. The third-through-fifth-grade students experienced a gain in math but a large loss of 9 NCEs in reading. Performance on the Core Knowledge test was average in the spring of third grade. Students experienced a slight decrease in NCEs on the Core Knowledge subtests by the spring of fifth grade.

Peabody Elementary School (COLORADO)

Location: Center of a small city

Student population: 499 students in Grades K-6

Ethnic breakdown:	90.8%	White
	4%	Asian-American
	3.2%	Hispanic
	1 %	African-American
	1%	Native American
Free- or reduced-price lunch:	6%	
Limited English Proficient:	0%	

Special features: Peabody is an alternative school of choice founded by a group of predominantly professional parents in 1993. Students apply from all over the district and are accepted on a first-come, first-served basis. Regular district school bus transportation is not provided.

Adoption of Core Knowledge: The parents who founded Peabody researched Core Knowledge extensively and then included it as one of the school's five "pillars of a good education."[14] They believed that Core would provide a literature-based, sequential curriculum.

Progress of Core Implementation: The school opened as a Core Knowledge school in 1993 with 125 students and attempted to implement Core completely. By 1995-96, when enrollment had risen to over 450 students, the school had reached full implementation. Peabody continued through the 1997-98 school year with a *high* level of implementation.

Mean percentages of overall CK content items taught or planned by regular classroom teachers (1997-98): Grade 3: 97%
Grade 5: 90%

Percentage of 2nd and 4th grade classrooms observed exhibiting Core content (1996-97): 100%

Percentage of 3rd and 5th grade classrooms observed exhibiting Core content (1997-98): 100%

Factors impacting Core Implementation: The parents who founded Peabody hired the principal, who was committed to achieving the school vision. The parents and the principal worked together to hire the teachers, who were also chosen because of their commitment to Core Knowledge and the other tenets of the school. Teachers did not have paid planning time to prepare for implementation and minimal common planning time thereafter. Due to funding constraints, few teachers had been able to attend the Core Knowledge conference other than when the conference was held in Colorado.

When Peabody opened, it benefitted from a grant from a foundation, which was used mainly to purchase materials to support Core Knowledge. The district also provided some funding for materials, as Peabody was a new school. While the principal attempted to supply teachers with what they needed for Core implementation, Peabody began with a very small library and a dearth of technology.

Teachers use a combination of project-based and more traditional methods to teach Core Knowledge content. They use teacher-developed materials as well as Macmillan-McGraw Hill texts for social studies, the Open Court series for reading, HBJ Math Plus, and Write Source for grammar. Teachers report that they make sure to teach *all* of the Core topics, but that the depth with which they cover particular units varies.

When it first opened, the school was under fire from community members who accused Peabody of teaching an elitist curriculum. In order to dispel these myths, the school held (and continues to hold) awareness meetings. The district was also initially wary of Peabody, given the community's negative view of the school. However, over time, the district has become very supportive, as the school has become a popular choice for parents, and test scores are among the top in the district. Recently, the district has built a new, state-of-the-art facility as a permanent home for the school.

While Peabody is under the governance of the local school district, it has almost complete autonomy with regard to curricular and staffing decisions. Parents play a very active role in school governance, in decision making, and in the day-to-day activities at Peabody. Teachers seem rather pleased with the novel governance structure. A teacher stated: "We feel

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[14] The four remaining pillars are: parents as partners in education, character education, student responsibility for their own learning, and choice in public education.

like we're doing it with people who share a common vision." The principal at Peabody also views their involvement as an asset: "I'm committed to a team leadership model. I can't give away my responsibility, but I can share the authority."

Teachers attributed much of the success of Core Knowledge at Peabody to the strong parent involvement. Parents have assisted teachers in finding Core Knowledge materials. A teacher explained: "The curriculum is rich, but without that support at home, I don't know if we could do all this." However, the involvement of parents created more accountability for teachers. One teacher explained: "Professionally it's very exciting, but there is some pressure." In fact, in 1996, a group of parents wanted to turn Peabody into a charter school, believing it would provide them with greater governance and control. In the end, these parents founded a Core Knowledge charter school and in 1997-98, about one-fourth of Peabody's students left to attend the new school. However, Peabody quickly filled the vacancies with students from their long waiting list. As of 1998, Peabody was enjoying newfound stability. Overall, commitment to Core among teachers, parents, and administration at the school site is strong, and Core is virtually certain to continue as a major feature of this school.

Table 22 provides achievement and attendance data in detail for Peabody. Data in Table 22 indicate that the 36 students at Peabody with complete achievement data based on the Comprehensive Test of Basic Skills (CTBS/4) for the fall of second grade and spring of third grade began the study at an above-average level of achievement (mean Reading Comprehension NCE pretest = 61.4, or about the 70th percentile). In the spring of third grade, those students experienced an 11.9 NCE gain in reading achievement (mean NCE = 73.3, or about the 86th percentile). Those same Peabody students began first grade with a slightly higher mean level for Math Concepts and Applications (NCE = 64.7, or about the 75th percentile). The group ended third grade with a mean NCE of 72.5 (the 85th percentile), for a 7.8 NCE gain in mathematics based on the CTBS/4.

Peabody's cohort of 29 students who were in third grade in the fall of 1995 and in fifth grade in the spring of 1998 experienced smaller gains in reading and math achievement. The group-mean reading score was above average with an NCE of 69.1 (81st percentile) in the fall of third grade. By the spring of fifth grade, the reading achievement mean had increased slightly to 73.5 (86th percentile). The third-through-fifth-grade cohort started out with a lower mean math achievement score of 63.5 (74th percentile). While the first-through-third-grade cohort experienced a gain in math from the fall of 1995 to the spring of 1998, the third-through-fifth-grade cohort's performance remained relatively the same with a NCE gain of 0.3.

The third graders scored above average on the three Core Knowledge subtests (Language Arts, Science, and Social Studies) in the spring of third grade. In the spring of fifth grade, gains occurred on each of the subtests (16.1 NCEs for Language Arts, 3.8 NCEs for Science, and 13.4 NCEs for Social Studies.)

The three-year mean student attendance rate for Peabody was 96.3.

Due to the absence of a matched-control group, nothing conclusive can be said about the efficacy of Core Knowledge at Peabody. However, Peabody does present a case of a strong implementation of Core Knowledge. Performance on the Core Knowledge and Achievement tests started out above average and increased over time for both cohorts.

Table 22: Peabody (CO) Test and Attendance Results

First-through-Third-Grade Cohort	N	Pretest Mean	(SD)	Posttest Mean	(SD)	Gain (loss)
Reading Achievement	36	61.4	(16.3)	73.3	(16.2)	11.9
Mathematics Achievement	36	64.7	(20.2)	72.5	(22.8)	7.8
Core Test: Lang. Arts	70			70.1	(.99; .63)	
Core Test: Science	70			69.3	(.93; .88)	
Core Test: Social Studies	70			70.1	(.95; .65)	
Third-through-Fifth-Grade Cohort						
Reading Achievement	29	69.1	(20.1)	73.5	(15.8)	4.4
Mathematics Achievement	29	63.5	(15.0)	63.8	(15.6)	0.3
Core Test: Lang. Arts	36	68.5	(.91; .59)	84.6	(1.70; .66)	16.1
Core Test: Science	36	70.9	(1.03;	74.7	(1.22; .69)	3.8
Core Test: Social Studies	36	67.7	(.86; .67)	81.1	(1.52; .69)	13.4
Three-Year Mean School Attendance Rate:			96.3			

High Country Elementary School (WASHINGTON)

Location: Suburban area

Student population: 492 students in Grades K-6

Ethnic breakdown:	76%	White
	20%	Latino
	1%	African-American
	2%	Asian
	1%	other
Free- or reduced-price lunch:	29%	
Limited English Proficient:	19%	

Special features: The school opened in 1993, and teachers were chosen by the principal. High Country is the designated site for bilingual education in the district.

Adoption of Core Knowledge: The principal first heard about Core Knowledge at the National Elementary Principal's Conference and then visited a Core school in Texas. Charged with opening the new school, he brought Core Knowledge to High Country with the consensus of the district administration, parents, and the local school board.

Progress of Core Knowledge Implementation: With the exception of the fine arts component, High Country attempted full implementation of Core Knowledge in its first year, 1993-94. By 1995-96 the school had reached a *high* level of implementation, teaching virtually all Core topics including the fine arts. This high level was maintained through the 1997-98 school year.

Mean percentages of overall CK content items taught or planned by regular classroom teachers (1997-98): Grade 3: 84%
Grade 5: 81%

Percentage of 2nd and 4th grade classrooms observed exhibiting Core content (1996-97): 83%

Percentage of 3rd and 5th grade classrooms observed exhibiting Core content (1997-98): 81%

Factors impacting Core Implementation: That teachers were chosen by the principal ensured support for Core from the beginning. As one teacher stated, "If you came to High Country, you had to buy into Core Knowledge." Many teachers were hired eight months in advance of the school's opening. This allowed them to pilot Core lessons in their former schools. Several meetings were held to plan for Core implementation during that time; some planning time in the summer was paid. Despite the time allotted, all teachers reported that planning for Core the first year was very time consuming. Teachers had one hour of shared planning time once a week. The principal stated that what makes Core work at High Country is the "top notch quality teaching staff." Teachers report that their support for Core increased over time, as they became more comfortable with the curriculum.

Since High Country was a new school when implementation of Core Knowledge began, the principal was able to spend the textbook allotment for materials geared toward Core. Early implementation was also supported by a private foundation start-up grant. This allowed the principal to fund teachers' attendance at the national conference and bring in Core Knowledge consultants to give a staff development session on how to write Core units.

The staff gave two informational presentations about Core to the parents at High Country before implementation. Parents have continued to be very supportive. The school sends a newsletter home to parents each month regarding Core Knowledge.

The school uses a mostly thematic, hands-on, project-based approach to teaching Core, with little dependence on textbooks. In 1995, the district mandated a strong focus on teaching reading, guided by the goal to have 90% of third graders reading on grade level. This added "extra stress" for teachers, particularly in the primary grades, as the goal created somewhat of a time pressure regarding coverage of Core material. To teach reading, High Country uses Macmillan's basal reading series as a foundation, and SRA Reading Mastery for Direct Instruction (DI) is used to teach reading to the lowest achieving students. Teachers also employ Accelerated Reader, McCracken's Spelling through Phonics, Six Trails Writing, and a variety of trade books as supplements. As of 1997, the school had 80% of the third grade students reading on grade level.

In 1997-98 the school experimented with a technology-focused classroom at the fourth and fifth grade levels, and an arts-focused classroom for Grades 2-3. Parents can also elect for their children to be in a dual language (English/Spanish) class in Grades 1-3. Within all of these special class arrangements, Core Knowledge is integrated. Overall, technology plays a very important role at High Country, and is closely aligned with the implementation of Core Knowledge.

The principal of High Country is a very strong supporter of Core Knowledge and does whatever he can to facilitate its implementation. In addition, the principal and staff are very active in local and national Core Knowledge networks. At least three-fourths of the teachers have attended the annual conference, and the principal has frequent contact with foundation staff. In 1996, the school received a grant from a foundation to fund a regional Core summer institute, and they have since helped numerous schools start Core Knowledge. Due to the fact that students have shown improvements in achievement over time, the school has attracted a lot of attention. As the principal stated, "Since the test results have come out, I've had twenty phone calls from schools around the state."

Due to High Country's success at implementing Core Knowledge, three of the district's 12 other elementary schools have chosen to implement the curriculum. High Country has teamed with some of these schools for planning Core units. The district has continued to be very supportive of Core Knowledge, and district administrators praise the merits of the program, pointing to High Country's rising test scores. Overall, it seems that Core is well institutionalized at this school and is virtually certain to continue.

Table 23 provides, in detail, information on achievement and attendance for High Country and its comparison school. Outcomes in Table 23 indicate that the 60 students at High Country with complete achievement data based on a locally administered Functional Test for the spring of first grade began the study at a slightly above-average level of achievement (mean reading NCE pretest = 54.1, or about the 57th percentile). In the spring of 1998, those students experienced a gain in reading achievement of 8.1 NCEs (mean NCE = 62.2, or about the 71st percentile).

Those same High Country students began first grade with a slightly higher mean level for math (NCE = 62.3, or about the 72nd percentile). However, the group ended third grade with a mean NCE of 55.4 (the 60th percentile), for a 6.9 NCE loss in mathematics based on the Functional Test.

High Country's cohort of students who were in third grade in the fall of 1995 and in fifth grade in the spring of 1998 experienced a gain in both reading and math achievement. The group-mean reading score was about average with an NCE of 48.8 (47th percentile) in the fall of third grade. By the spring of fifth grade, the reading achievement mean had increased 15.8 NCEs to 64.6 (75th percentile). The third-through-fifth-grade cohort started out with a higher mean math achievement score of 54.8. While the first-through-third-grade cohort experienced a loss from the spring of 1995 to the spring of 1998, the third-through-fifth-grade cohort experienced a gain of 14.6 NCEs.

The third graders scored about average on the three Core Knowledge subtests (language arts, science, and social studies) in the spring of third grade. Their scores for language arts and science increased in the spring of 1998 (7.4 and 5.9 NCEs respectively) but decreased for the social studies subtest by 2.3 NCE points.

The three-year mean student attendance rate for High Country was 97.0%.

At the Washington control school, fall of first grade reading scores were close to national average (mean NCE = 50.7). By the spring of third grade, students in the control school experienced a 12.9 NCEs increase. Math began slightly above the national average (54.1 NCEs) and decreased slightly by the spring of fifth grade to 52.2 NCEs. Thus, control students experienced a greater gain in reading achievement and a smaller loss in math achievement than the first-through-third-grade cohort at High Country.

Table 23: High Country (WA) Test and Attendance Results

First-through-Third-Grade Cohort	N	Pretest Mean	(SD)	Posttest Mean	(SD)	Gain (loss)
Reading Achievement	60	54.1	(17.6)	62.2	(20.5)	8.1
Mathematics Achievement	60	62.3	(21.7)	55.4	(17.9)	-6.9
Core Test: Lang. Arts	85			52.1	(.12; .93)	
Core Test: Science	85			57.5	(.37; 1.02)	
Core Test: Social Studies	85			61.0	(.53; .76)	
Third-through-Fifth-Grade Cohort						
Reading Achievement	72	48.8	17.2	64.6	17.3	15.8
Mathematics Achievement	76	54.8	13.6	69.4	18.0	14.6
Core Test: Lang. Arts	69	46.8	(-.15;	54.2	(.21; .93)	7.4
Core Test: Science	69	53.2	(.15; .81)	59.3	(.44; .99)	5.9
Core Test: Social Studies	69	59.3	(.46; .75)	57.0	(.33; 1.01)	-2.3
Three-Year Mean School Attendance Rate:			97.0			

Matched Control School (WA) Test and Attendance Results

First-through-Third-Grade Cohort	N	Pretest Mean	(SD)	Posttest Mean	(SD)	Gain (loss)
Reading Achievement	40	50.7	(19.9)	63.6	(21.1)	12.9
Mathematics Achievement	42	54.1	(25.4)	52.2	(18.5)	-1.9
Core Test: Lang. Arts						
Core Test: Science						
Core Test: Social Studies						
Third-through-Fifth-Grade Cohort						
Reading Achievement	50	48.7	(14.0)	58.9	(17.7)	10.2
Mathematics Achievement	46	48.6	(16.3)	52.2	(16.5)	3.6
Core Test: Lang. Arts	75	50.0	(-.00; .79)			
Core Test: Science	75	51.1	(.04; .86)			
Core Test: Social Studies	75	39.6	(-.50; .70)			
Three-Year Mean School Attendance Rate:			95.0			

The Washington control school's third-through-fifth-grade cohort began the study with relatively average reading scores (48.7 NCEs) and math scores (48.6 NCEs). By the spring of fifth grade, those scores had increased 10.2 NCEs for reading and 3.6 NCEs for math. NCE gains in both math and reading achievement for the fifth graders in the control school were smaller than gains made by fifth graders at High Country.

High Country presents a case of a strong implementation of Core Knowledge. While control students outperformed High Country students on achievement in the first-through-third-grade cohort, High Country students in the third-through-fifth-grade cohort experienced greater gains in both reading and math achievement. A comparison could not be made of achievement on the Core Knowledge test because the control school declined to take the test in the spring of 1998.

B. New Implementation Sites

Alder Elementary School (FLORIDA)

Location: Residential/Commercial area

Student population: 670 students Grades K-5

Ethnic breakdown:	63%	White
	27%	African-American
	10%	Latino
Free- or reduced-price lunch:	52%	
Limited-English Proficient:	10%	

Special features: The school is a designated site for Exceptional Student Education: one-fifth of the school's population is either gifted, or physically or mentally challenged.

Adoption of Core Knowledge: Core Knowledge was first introduced to Alder in 1992 by the school's then principal. This principal had heard about the successes of Core at nearby Woodlands Elementary, which is located in the same district.

Progress of Core Implementation: Implementation of Core began slowly in 1992-93, with some teachers voluntarily incorporating a few Core Units. However, full-scale efforts at implementation did not begin until 1995-96. Since that time, the level of Core implementation has risen significantly, reaching a *moderate* level in 1997-98.

Mean percentages of overall CK content items taught or planned by regular classroom teachers (1997-98): Grade 3: 64%
Grade 5: 77%

Percentage of 3rd and 5th grade classrooms observed exhibiting Core content (1997-98): 66%

Factors impacting Core Implementation: As a parent explained, "Lip service was paid to Core Knowledge in the first few years," but it wasn't a major school-wide effort. The major push toward full implementation of Core during the 1995-96 school year can be attributed to the leadership of a new principal. She was a strong advocate of Core Knowledge and had implemented it successfully at another district school. At Alder, she began by encouraging teachers to teach as much Core as they felt comfortable with, and gave them common planning time each week (this, however, changed in subsequent years). The staff included a mix of teachers who were enthusiastic about, and those who were resistant to, Core. As one teacher explained: "Some of the teachers objected to being told what to teach."

Some teachers had been teaching selected Core lessons for the two years prior to full-scale implementation efforts; for them, a greater push for Core was welcome. However, the more resistant teachers began in 1995-96 with a few Core units. Typically, teachers began with social studies and science, teaching Core literature more sporadically. As one stated: "I approach it with a very relaxed, fun tone.... We usually do it in the afternoon." Some teachers rotated to teach the same subject to different classes. By 1997-98, the teachers had developed a monthly scope and sequence based on Core Knowledge for each grade level. At that point in time, most of the teachers were supportive of Core, but a minority was still resistant. This created problems with team planning among teachers, as some did not get involved. Combination classes (e.g., Grades 3 and 4 together) also created problems for teachers, as well as for students, who were sometimes exposed to the same Core content two years in a row.

The PTA helped support the purchase of Core materials, but the budget was small ($4000 for all teacher supplies, not just Core), and most teachers paid for their own Core resources. A lack of resources was a limiting factor to Core implementation. The principal was able to use funds from the school improvement fund to send teams of teachers to the Core annual conference in 1996 and 1997 and then held a fundraiser to send 10 teachers to the conference in 1998. The educators at Alder have ongoing contact with the foundation.

Teachers at Alder use a project-based approach to teaching Core — "really hands-on," explained a teacher. This school is distinguished by especially creative Core Knowledge culminating activities, often involving performing arts. There is emphasis on including ESE students in these activities. As the new principal stated: "It doesn't matter if you're in the gifted, or if you're in the physically-impaired class, or if you're in the pre-K, we're a family, and everybody is involved." Teachers use the HBJ Treasury of Literature and Houghton Mifflin for reading, supplemented by trade books and novels, and the Math Plus program. The school also has the Accelerated Reader and Writing to Write computer programs.

In 1997-98, the principal left to assume leadership of another school, and was replaced by a new principal who voiced strong support for Core. Still, some teachers worried that with the departure of their previous principal, Core Knowledge was "wavering a bit." At the same time, the district mandated its own core curriculum, however it was much less detailed than Core. Teachers said that it complemented Core Knowledge and did not pose a problem for them, but that integrating the standards into their scope and sequence took time. In addition, the district's move to controlled choice was something that educators were concerned about. Overall, it appears that Core implementation has reached a level of long-term sustainability at Alder. A supportive administration and the hiring of new teachers (as others retire) who are enthusiastic about Core will be critical to its school-wide implementation in future years.

Table 24 provides achievement and attendance data in detail for Alder. Table 24 shows that the 31 students at Alder with complete achievement data based on the Comprehensive Test of Basic Skills (CTBS/4) for the spring of kindergarten and spring of third grade began the study at a slightly above-average level of achievement (mean Reading Comprehension NCE pretest = 58.6; mean Math Concepts and Applications NCE pretest = 57.1 or about the 65th and 63rd percentiles, respectively). By the spring of third grade, performance had increased to 70.4 NCEs (83rd percentile) for reading and 60.4 NCEs (69th percentile) for math.

Alder's cohort of 50 students who were in third grade in the fall of 1995 began the study at an above average level of achievement for reading (mean NCE = 67.6) and math (mean NCE = 76.4). By the spring of fifth grade, reading achievement mean had decreased slightly to 64.1 (a 3.5 NCE loss) and math achievement remained exactly the same for those same 50 students.

The third graders scored above average on all three of the Core Knowledge subtests. In the spring of third grade the means for Language Arts, Science, and Social Studies were 67.0 NCEs, 61.7 NCEs, and 59.9 NCEs, respectively. By the spring of fifth grade, performance had dropped on all three subtests with the biggest loss occurring for Language Arts (a loss of 15.4 NCEs and 26 percentile points). Smaller losses occurred for Science (3.3 NCEs) and Social Studies (4.6 NCEs).

Table 24: Alder (FL) Test and Attendance Results

First-through-Third-Grade Cohort	N	Pretest Mean	(SD)	Posttest Mean	(SD)	Gain (loss)
Reading Achievement	31	58.6	(15.3)	70.4	(16.9)	11.7
Mathematics Achievement	31	57.1	(16.1)	60.4	(12.9)	3.2
Core Test: Lang. Arts	58			54.2	(.22; .81)	
Core Test: Science	58			54.2	(.20; .83)	
Core Test: Social Studies	58			52.6	(.13; .73)	
Third-through-Fifth-Grade Cohort						
Reading Achievement	50	67.6	(20.9)	64.1	(19.6)	-3.5
Mathematics Achievement	50	76.4	(17.4)	76.4	(22.0)	0.0
Core Test: Lang. Arts	46	67.0	(.83; .82)	51.6	(.09; .97)	-15.4
Core Test: Science	46	61.7	(.55; .83)	57.0	(.34; .81)	-3.3
Core Test: Social Studies	46	59.9	(.47; .82)	55.3	(.26; .99)	-4.6
Three-Year Mean School Attendance Rate:			95.2			

The three-year mean student attendance rate for Alder was 95.2%.

Due to the absence of a matched-control group, it is difficult to speak conclusively about the efficacy of Core Knowledge at Alder. However, Alder does present a case of a relatively high-achieving school. Performance on both achievement tests increased for the first-through-third-grade cohort and decreased slightly or remained the same for the third-through-fifth-grade cohort resulting in above-average performance in both reading and math by the spring of 1998. Performance on the Core Knowledge subtests decreased for the third-through-fifth-grade cohort resulting in average to slightly above-average performance by the spring of 1998.

Riverside Elementary School (TEXAS)

Location: Suburban community

Student population:	496 students in Grades K-5		
	Ethnic breakdown:	55%	White
		25.2%	Latino
		17.1%	African American
		2.2%	Asian
		0.2	Native American
	Free- or reduced-price lunch:	44.4%	
	Limited English Proficient:	0	

Adoption of Core Knowledge: The assistant principal introduced Core to the school in 1994, after learning about Core in a graduate class at a local university. Numerous discussions were held among staff and administrators to establish the school's needs, vision, and goals before the decision to adopt Core was made through consensus.

Progress of Core Implementation: The first official year of implementation was 1994-95. During that year, teachers piloted Core units. By 1995-96, teachers taught about half of the topics in the sequence, mostly science and social studies. By 1997-98, the school had achieved a *moderate* implementation of Core Knowledge.

Mean percentages of overall CK content items taught or planned by regular classroom teachers (1997-98): Grade 3: 77%
Grade 5: 62%

Percentage of 3rd and 5th grade classrooms observed exhibiting Core content (1997-98): 57%

Factors impacting Core Implementation: The assistant principal (who became principal in 1996 when the previous principal retired) used a gradual phase-in approach to Core implementation. She felt this was important in gaining support throughout the school.

A teacher explained: "They've always said, 'Start slow. Take a unit a year, if you have to.'" As a result, almost all teachers felt as though they had input on the decision to implement Core. Still, some teachers were initially not enthusiastic about Core and a few chose to leave the school.

Like Englewood Elementary, Riverside (located in the same metropolitan area) benefits from a strong alliance with a local university, which provided for staff development, involvement in networking with other schools, and grant funding. Regarding the university partnership, the principal stated: "All it takes is a phone call and [professors] will come out" and dialogue with teachers. This connection with the university was very important in the early years of implementation.

A local foundation gave the school a three-year grant totaling approximately $90,000 to facilitate Core implementation. The PTA and the district also provided some start-up funds. This funding allowed the principal to send teachers to the annual conference and bring in subject-matter experts from local high schools and universities to present on Core content. It also allowed for the purchase of materials. One teacher explained: "We can turn in a list of Core needs (materials), and receive them." Still, a few others felt that they had to spend their own money. Riverside also upgraded its library and added a high-tech multimedia center. Technology is used to "bring to life what [students] are learning" in Core, explained the principal, as students go on "electronic field trips."

For the first two years, teachers had one-half day per month, when there was early student dismissal, to engage in curriculum planning. This was achieved through a state waiver, for which the school applied with the district support. Teachers also had 45 minutes each week for grade level meetings. At some grade levels (e.g., first), teachers rotated to teach the same Core unit to all classes.

The school uses a mostly hands-on, project-based approach to teaching Core, although each teacher is free to choose his or her own preferred methods. In 1997-98, the school began a new literacy program, which involved individually administered reading assessments, teaching through centers, and *Guided Reading* materials. The school attempted to coordinate literacy and Core, but teachers were reportedly tired out by the new demands.

In 1997-98, the school lost Title I and some ADA funding, as the percentage of students receiving free- and reduced-price lunch dropped and the sixth grade was moved out of the school. However, the extra space allowed for the establishment of a Literacy Resource Room, where Core Knowledge materials are housed, and a new Parent Center. Riverside implemented a parent involvement plan modeled after Englewood's.

The staff is active in local and national Core Knowledge networks. Most teachers have attended at least one annual conference, and visitors come to the school often. The principal is the leader of the Core Knowledge strand for a network of schools coordinated by the local university. At various times, this involved holding seminars, connecting with business partners, and sharing resources among teachers and administrators in other local Core schools.

Riverside's scores on the state test are well up from several years ago, a rise that the principal attributes to Core Knowledge and the process of change that accompanied it. Although Riverside's students have performed very well on state tests, the principal and teachers said that the tests still created a real pressure for them, which sometimes meant that less time was spent on Core.

The district, which favors site-based management, has been very supportive of Core Knowledge. Two of the 13 other elementary schools in the district have adopted Core. "We have an incredible amount of support," stated one teacher. With the district support and the fact that most teachers voice positive benefits, the long-term prognosis for Core at Riverside is good. However, the current principal is clearly the major advocate and some feared that Core implementation would wane if she left the school.

Table 25 provides detailed information on achievement and attendance for Riverside. Data in Table 25 indicate that the 37 first-through-third-grade students at Riverside with complete achievement data began the study at a below-average level in reading achievement with a mean NCE of 42.9 (based on the Metropolitan Achievement Test). By the spring of third grade, reading achievement (based on the Comprehensive Test of Basic Skills)[15] had improved with a group mean NCE of 53.8. Performance in math remained above average increasing from a mean of 53.0 NCEs in the fall of first grade to a mean of 58.8 NCEs in the spring of third grade.

Riverside's cohort of students who were in third grade in the fall also began the study at a below-average level of achievement for reading (mean NCE = 49.6) and math (mean NCE =

[15] Although the pretest and posttest means were based on separate tests, they do measure similar domains. By converting the outcomes from percentiles to NCE scores, we were able to express the achievement outcomes in the same metric.

46.7) on the Metropolitan Achievement Test. By the spring of fifth grade, the reading achievement mean had increased slightly to 52.3 (a 2.7 NCE gain) and math achievement increased to 58.4 NCEs (a gain of 11.7 NCE points and 22 percentile points) based on the CTBS/4 achievement test.

The third graders scored slightly above average on all three of the Core Knowledge subtests. In the spring of third grade, the means for Language Arts, Science, and Social Studies were 54.8 NCEs, 57.0 NCEs, and 59.9 NCEs, respectively. By the spring of fifth grade, performance had dropped 8 NCEs for Language Arts and 3.2 NCEs for Science. There was a small gain of 1.8 NCEs for Social Studies.

The three-year mean student attendance rate for Riverside was 96.8%.

Riverside presents a case of a moderately strong implementation of Core Knowledge. For both cohorts, achievement in reading and math improved from the fall of 1995 to the spring of 1998. In contrast, performance on the Core Knowledge test for the third-to-fifth-grade cohort decreased slightly or remained relatively the same. However, due to the absence of a matched-control group, it is difficult to use this data to speculate about the efficacy of Core Knowledge.

Table 25: Riverside (TX) Test and Attendance Results

First-through-Third-Grade Cohort	N	Pretest Mean	(SD)	Posttest Mean	(SD)	Gain (loss)
Reading Achievement	37	42.9	(15.8)	53.8	(17.3)	10.9
Mathematics Achievement	37	53.0	(17.0)	58.8	(17.5)	5.8
Core Test: Lang. Arts	65			57.5	(.37; .64)	
Core Test: Science	65			57.0	(.33; .84)	
Core Test: Social Studies	65			58.7	(.43; .78)	
Third-through-Fifth-Grade Cohort						
Reading Achievement	43	49.6	(17.8)	52.3	(17.1)	2.7
Mathematics Achievement	42	46.7	(22.2)	58.4	(14.6)	11.7
Core Test: Lang. Arts	43	54.8	(.23;	46.8	(-.15; .79)	-8.0
Core Test: Science	43	57.0	(.33;	54.2	(.22; .81)	-3.2
Core Test: Social Studies	43	59.9	(.48;	61.7	(.56; .73)	1.8
Three-Year Mean School Attendance Rate:			96.8			

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Carson Elementary School (TENNESEE)

Location: Low-income community

Student population:	500 students in Grades K-6	
	Ethnic breakdown:	100% African-American
	Free- or reduced-price lunch:	74%
	Limited English Proficient:	0

Special features: (1) Modern Red Schoolhouse[16] (Heady & Kilgore, 1996); (2) Thirty-one percent of students attend the school through an optional transfer.

Adoption of Core Knowledge: Guided by the leadership of the principal, the teachers at Carson voted to adopt the New American Schools' Modern Red Schoolhouse (MR) restructuring design (of which Core Knowledge is a part) in 1995. The district is involved in a major New American School's scale-up effort.

Progress of Core Implementation (1995-1998): The 1995-96 school year was a planning year for MR implementation, and Core Knowledge was not implemented. During the 1996-97 school year, the Carson faculty developed their scope and sequence and began to develop and pilot some Core Knowledge lessons as part of their MR implementation of "foundation units." In 1997-98, the school was engaged in a *low to moderate*, though promising, level of Core Knowledge implementation.

Mean percentages of overall CK content items taught or planned by regular classroom teachers (1997-98): Grade 3: 46%
Grade 5: 63%

Percentage of 3rd and 5th grade classrooms observed exhibiting Core content (1997-98): 60%

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[16] The Modern Red Schoolhouse design is a New American Schools reform model developed by the Hudson Institute of Indianapolis and now based at the Modern Red Schoolhouse Institute in Nashville. This reform model aims to extend and deepen the educational assets embodied in the classic "little red schoolhouse" (Heady & Kilgore, 1996). Six tenets embody the goals of this reform:

1) All students can reach high educational standards, in different time frames and ways.
2) The school's work should introduce students to principles of democratic government and pluralism. The curriculum covers the basic disciplines as well as certain work-related skills.
3) Although principals may be appointed centrally, all decisions about instruction and the use of resources should be based at the school.
4) Schools should combine flexibility and accountability.
5) Advanced technology is crucial to a modern education. Each teacher in the school should have a computer, and a Modern Red Schoolhouse should maintain a target ratio of one computer for every six students, although their concentration may vary with student age level.
6) Students and staff should choose their schools. After considering any applicable court orders, geographical proximity, and sibling preference, selection for a Modern Red Schoolhouse should be random.

Education in a Modern Red Schoolhouse is framed in an Individual Educational Compact between a student and his or her parents and teacher. The Modern Red Schoolhouse groups students into primary, intermediate, and upper divisions, ending at the traditional Grades 4, 8, and 12, respectively. Schedules for students and teachers vary, and curricula are divided into "Hudson units," reflecting academic accomplishment rather than seat time. During the elementary grades, students in Modern Red schools are taught the Core Knowledge Sequence for one-half of each day.

Factors impacting Core Implementation: In preparation for teaching Core Knowledge, teachers at Carson were provided with common planning time to develop Core Knowledge units. Several teachers also attended the 1998 Core Knowledge conference, and some visited a MR school in New York. The district paid for MR consultants to provide training, but this was not specifically for Core Knowledge.

The principal is supportive of both Core Knowledge and of the teachers. Still, some teachers felt that implementation of Core Knowledge was hindered by a lack of materials that were appropriate for particular grade levels. Teachers also complained that "there is an incredible amount of work involved in writing units" and that some units in the Core Knowledge Sequence did not have MR standards to go along with them. Teachers expressed the need for an on-site curriculum coordinator.

However, support for Core Knowledge increased as teachers began to use the curriculum in their classrooms. Teachers reported that Core provided them the chance to extend thematic teaching, rely on textbooks less, and collaborate with each other more. Instructional approaches for teaching reading were at the discretion of the teachers, allowing teachers to use trade books and a variety of basals (HBJ, Silver Burdett). Teachers attempted to teach skills through Core as often as possible. As one teacher stated: "My spelling words were Native Americans. My math was Native Americans...."

There is a strong push from the district to implement the Modern Red Schoolhouse design. However, at the same time, teachers are held accountable for student performance on a high stakes, state-mandated assessment test. Teachers expressed that it was difficult to meet the demand to integrate skills required by the state test, standards required by MR, and the Core Knowledge standards.

Although the teachers were generally in favor of Core Knowledge, some expressed reservations about the overall Modern Red Schoolhouse design, particularly early on. Fourteen teachers left the school since the adoption of MR, and new teachers were then hired based on their interest in implementing the design. Some teachers' initial negative feelings about MR were related to poor design team support, lack of technology available to the school, and the fact that other schools have dropped MR, leading them to question the design's viability. These problems led one teacher to say, "I would rather be a Core Knowledge-only school."

However, in 1998, enthusiasm for the overall MR design increased, as support from the MR design team improved substantially. By the end of the school year, Carson had implemented the MR task force structure, completed the scope and sequence planning, and developed interdisciplinary units. These accomplishments helped Carson earn the distinction of being a national MR site. This distinction, combined with teacher and principal support for Core, suggest that Core Knowledge (and MR) are likely to continue to be implemented at Carson in the coming year.

Table 26 provides achievement and attendance data in detail for Carson. The 27 students in the first-through-third-grade cohort at Carson with complete reading achievement data based on the Comprehensive Test of Basic Skills began the study at a slightly below-average level of Reading Comprehension with a mean NCE of 41.6 in the spring of kindergarten. Reading achievement increased over time for the first-through-third-grade cohort to a mean of 51.5 NCEs in the spring of third grade (based on the TCAP)[17] representing an increase of 18 percentile points. Math achievement followed a similar course. Students with complete Math Concepts and Applications data experienced a 6.3 NCE gain in math achievement. The group-mean math achievement score was 39.4 NCEs on the CTBS/4 in the spring of kindergarten and increased to 45.7 NCEs on the TCAP in the spring of third grade representing an 11 percentile point gain.

Carson's cohort of students who were in third grade in the fall of 1995 followed a different trajectory. The 31 third-through-fifth-grade students with complete achievement data began the study with slightly above average achievement in reading (mean = 56.4 NCEs) and math (mean = 56.9 NCEs) on the CTBS/4. By the spring of fifth grade, the reading achievement mean had decreased to 49.0 (a 13.1 percentile point loss) and math achievement decreased to 45.0 NCEs (a loss of 22 percentile points) based on the TCAP.

Performance on the Core Knowledge subtests was below average for third-grade students in the spring of 1996. By the spring of fifth grade, performance had remained relatively constant for Language Arts and Science but increased 8.9 NCE points for Social Studies moving the group mean from the 25th to the 40th percentile. This increase in social studies resulted in a relatively consistent performance in each of the subtests by the spring of fifth grade.

The three-year mean student attendance rate for Carson was 96.0%.

Table 26: Carson (TN) Test and Attendance Results

First-through-Third-Grade Cohort	N	Pretest Mean	(SD)	Posttest Mean	(SD)	Gain (loss)
Reading Achievement	27	41.6	(11.8)	51.5	(15.8)	10.1
Mathematics Achievement	27	39.4	(14.7)	45.7	(13.6)	6.3
Core Test: Lang. Arts	64			49.5	(-.03; .62)	
Core Test: Science	65			43.0	(-.33; .59)	
Core Test: Social Studies	65			37.7	(-.59; .67)	
Third-through-Fifth-Grade Cohort						
Reading Achievement	31	56.4	(17.3)	49.0	(16.9)	-7.4
Mathematics Achievement	31	56.9	(18.7)	45.0	(12.6)	-11.9
Core Test: Lang. Arts	35	44.1	(-.29; .88)	42.5	(-.38; 1.18)	-1.6
Core Test: Science	35	42.5	(-.37; .65)	43.0	(-.34; .75)	1.5
Core Test: Social Studies	35	35.8	(-.67; .52)	44.7	(-.25; .72)	8.9
Three-Year Mean School Attendance Rate:			96.0			

[17] Although the pretest and posttest means were based on separate tests, they do measure similar domains. By converting the outcomes from percentiles to NCE scores, we were able to express the achievement outcomes in the same metric.

Due to the absence of a matched-control group, conclusive judgements about the efficacy of Core Knowledge at Carson cannot be made. The first-through-third-grade students, while starting the study below average, did experience gains in both reading and math achievement. However, the third-through-fifth-grade students who started the study achieving slightly above average lost ground in reading and math by the spring of fifth grade resulting in slightly below-average achievement. Performance on the Core Knowledge test was below average in the spring of third grade and remained relatively stable for language arts and science over time. Students did experience, however, an increase in social studies, making performance on this subtest comparable with performance on the other subtests.

Colonial Elementary School (MARYLAND)

Location: Low-income community

Student population: 403 students in Grades K-5

Ethnic breakdown:	70%	African American
	30%	White
Free- or reduced-price lunch:	74%	
Limited English Proficient:	0	

Adoption of Core Knowledge: Much like Garvey, Colonial Elementary became a Core Knowledge school in 1994 after the principal and a small group of teachers applied for a grant from a local foundation to support Core Knowledge implementation for the first two years. According to the principal, the motivation for adopting Core Knowledge was the hope that it would "spark children's interests" and help the school "avoid reconstitution."

Progress of Core Implementation: During the first year of implementation, 1994-95, enthusiasm was high and teachers incorporated elements of Core Knowledge, resulting in a moderate, promising level of implementation in 1995-96. By 1996-97, Core implementation began to decline. In 1998, data confirmed that Core Knowledge implementation was *low*. Some elements of Core Knowledge were implemented. However, there was great variability among teachers and across grade levels. Some teachers chose to teach either none or very little of Core Knowledge.

Mean percentages of overall CK content items taught or planned by regular classroom teachers (1997-98): Grade 3: 36%
Grade 5: 54%

Percentage of 3rd and 5th grade classrooms observed exhibiting Core content (1997-98): 43%

Factors impacting Core implementation: The foundation grant of $27,000 ($22,000 in the first year; $5,000 in the second year) allowed the principal to give eight teachers paid planning time in the summer before implementation to develop Core units and the opportunity to purchase materials for a Core Knowledge "closet" at the school. However, some teachers reported that there were insufficient materials to teach Core. That not all teachers were involved in developing the scope and sequence also created some problems. Some teachers thought the units by their colleagues were too long, too short, etc., and thus they had to create their own.

Still, teachers who were at Colonial when Core implementation began felt that it enhanced their professional experience. "The first year or two, we were gung-ho," explained one teacher. They tended to feel some ownership for it, whereas new teachers tended not to. At the same time, most teachers agreed that Core "expanded students' knowledge, particularly about diverse cultures and times," "caught different kids with different topics," and provided interesting content for students to write about.

Team teaching occurred in Grades 3-6 around subjects. This was done so that teachers would have fewer Core Knowledge lessons to prepare. For example, one teacher would teach science and social studies to two classes, while his or her partner would teach math and language. In 1997-98, the teachers had one hour of common planning time every two weeks, a decrease from the two hours per week of two years prior.

The principal had received encouragement for implementing Core from the region superintendent. However, in the fall of 1997, the principal attended a meeting at the central office during which she was told to use the district curriculum to prepare students for the state performance assessment test. This took teachers' time away from teaching Core Knowledge (as the two curricula are reportedly not easily integrated, particularly at Grades 2 and 4). The principal allowed teachers to do as much or as little (or no) Core as they wished. She expressed: "Core Knowledge is good, but you cannot just do Core.... I have to address everything else."

In 1997-98, the principal purchased the Core Knowledge lessons developed by the Baltimore Curriculum Project staff, yet she still did not press teachers to teach Core. Most staff development was focused on the state-mandated performance assessment test. Two teachers, whom the principal saw as most committed to Core since the beginning, were sent to the Core National Conference in 1998; however at the same time, new teachers were given no training in Core or assistance in implementation. While some teachers appeared to feel supported by the principal, there were tense relations and resentment between the principal and a number of other teachers.

In the fall of 1997, as pressure to perform on state and district tests heightened, Colonial also adopted two new programs — the McGraw-Hill & Macmillan, "Spotlight on Literacy" program and the Imaginitis creative writing program. By the spring of that school year, the district adopted two new reading series, Open Court for Grades K-2 and Houghton Mifflin for Grades 3-5. This meant that the teachers were in for another change. As one stated: "It just keeps snowballing." Given the multiple pressures and programs teachers are faced with, the long-term prognosis for Core Knowledge at Colonial is not good. As one teacher stated, "Something has to pull out," and that will likely be Core.

Table 27 provides achievement and attendance data in detail for Colonial. Data in Table 27 indicate that the 25 students in the first-through-third-grade cohort at Colonial with complete achievement data based on the Comprehensive Test of Basic Skills (CTBS/4) began the study at an above-average level of achievement (mean reading NCE pretest = 61.5; mean math NCE pretest = 65.2 or about the 70th and 76th percentiles, respectively). By the spring of third grade, performance was below average in both reading and math. There was a drop of 18.8 NCEs for reading, representing a loss of 34 percentile points and a loss 18.3 NCEs or 32 percentile points for math.

Colonial's cohort of students who were in third grade in the fall of 1995 began the study at a lower level of achievement. The group-mean reading score was below average for the 27 students with complete data with an NCE of 41.8 (35th percentile) in the fall of third grade. By the spring of fifth grade, the reading achievement mean had decreased to 38.7 (29th percentile). The 26 third-through-fifth-grade students with complete math achievement data started out with a below-average mean math score of 47.4 NCEs (45th percentile). By the spring of fifth grade, those students had experienced a slight gain in math with a mean achievement score of 49.3 NCEs.

The third graders scored average on two of the three Core Knowledge subtests (Language Arts and Social Studies) and below average on the Science subtest in the spring of third grade. By the spring of fifth grade, performance was below average on all three of the subtests. There was a loss of 15.2 NCEs in Language Arts representing a loss of 28 percentile points and a loss of 20.6 NCEs in Social Studies representing a loss of 35 percentile points. There was a small gain of 5.8 NCEs in Science.

The three-year mean student attendance rate for Colonial was 95.2%.

Table 27: Colonial (MD) Test and Attendance Results

First-through-Third-Grade Cohort	N	Pretest Mean	(SD)	Posttest Mean	(SD)	Gain (loss)
Reading Achievement	25	61.5	(20.4)	42.7	(18.0)	-18.8
Mathematics Achievement	25	65.2	(28.4)	46.9	(14.5)	-18.3
Core Test: Lang. Arts	20			37.7	(-.59; .85)	
Core Test: Science	20			33.0	(-.82; .60)	
Core Test: Social Studies	20			42.5	(-.37; .81)	
Third-through-Fifth-Grade Cohort						
Reading Achievement	27	41.8	(17.8)	38.7	(18.2)	-3.0
Mathematics Achievement	26	47.4	(18.5)	49.3	(17.8)	1.8
Core Test: Lang. Arts	22	54.8	(.23;	39.6	(-.50; .66)	-15.2
Core Test: Science	22	30.7	(-.92; .75)	36.5	(-.64; .64)	5.8
Core Test: Social Studies	22	52.1	(.13; .85)	31.5	(-.91; .62)	-20.6
Three-Year Mean School Attendance Rate:			95.2			

Colonial presents a case of a relatively weak implementation of Core Knowledge. Performance on the Core Knowledge and achievement tests decreased or remained relatively the same over time for both cohorts resulting in below average performance by the spring of 1998. However, due to the absence of a matched-control group, nothing conclusive can be said about the efficacy of Core Knowledge at Colonial.

Vine Elementary School (MARYLAND)

Location: Rural/Suburban area

Student population:	606 students in Grades K-5		
	Ethnic breakdown:	84%	White
		14%	African-American
		1%	Hispanic
		0.5%	Asian
		0.5%	Native American
	Free- or reduced-price lunch:	9.8%	
	Limited English Proficient:	0	

Adoption of Core Knowledge: The district superintendent introduced Core Knowledge to the principal in 1994. There was grant funding for Core implementation available from a local foundation. The principal invited Core consultants to present the program to the staff and then obtained a positive teacher vote in favor of teaching Core. The teachers believed Core would be "a much better program than what [they] had" for social studies and science.

Progress of Core Implementation: The school attempted to implement Core in all grades during the first year, 1994-95, but they did not implement all units. In the second year (1995-96), the teachers covered more units. Implementation of the science and social studies components of Core was strong. However there was little attention to other Core subjects. This overall *moderate* level of implementation continued through 1997-98.

Mean percentages of overall CK content items taught or planned by regular classroom teachers (1997-98): Data not available.[18]

Percentage of 3rd and 5th grade classrooms observed exhibiting Core content (1997-98): 77%

Factors impacting Core Implementation: The principal applied for and received a grant totaling $27,000 ($22,000 in Year 1; $5,000 in Year 2) for Core Knowledge implementation from the local foundation. Like Garvey and Colonial, Vine was one of 6 schools in the state that received these grants. This grant funding and additional district funding provided for the purchase of materials, chosen by teachers, and allowed teachers paid planning time while substitutes covered their classes during the first years of implementation. Teachers had four hours paid twice per month in the first year and two and one-half hours twice per month in the second year. Lead teachers at each grade level also worked during the summer before implementation to develop the scope and sequence. In spite of this planning time, teachers found the first year very difficult. As one explained: "Many teachers thought it was unfair that we were writing the curriculum."

In 1995, the superintendent mandated implementation of Core Knowledge in *all* of the elementary schools in the district. This facilitated implementation at Vine in that the faculty at Vine teamed with teachers at other district schools in developing Core Knowledge units for science and social studies. A teacher explained: "We divided up the units and it turned out very nicely. But now we have some beautiful units that are just way too long." Many teachers felt pressed for time and frustrated in regards to fitting everything in. Teachers suggested "scaling down" the amount of content that is expected to be covered at each grade level.

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[18] The teachers at Vine were very reluctant to have us conduct research in their school and complained about the time commitment involved. Therefore, we did not ask them to complete the surveys.

Most teachers at Vine used an activity-based approach to Core Knowledge instruction that is guided by the state's performance assessment program. It is the district's intent that the state performance assessment guidelines would provide the *how* of teaching, whereas Core Knowledge would provide the *what*. A teacher explained: "We incorporate in each of these units outcome goals that they are looking for on the test." This school uses the D.C. Heath series for reading and the Open Court series for math, which the teachers feel cover the major elements of Core Knowledge in those areas. Each class visits the media center for 45 minutes per week, during which time they are presented lessons that relate to Core material — typically literature. This was done so that teachers would not be responsible for additional Core content. Thus, the Core emphasis in classrooms was on science and social studies.

Core Knowledge consultants visited the school in the first year to provide training. However, since that time, contact with the Foundation has been minimal, apart from the fact that many teachers attended the annual conference when it was in Baltimore in 1996. Parents were supportive of Core, although the teachers thought some were not sure what Core Knowledge really was. The school sends home a monthly newsletter listing what Core topics will be covered.

The long-term stability of Core Knowledge at Vine is questionable. The superintendent left the district in 1997 as the result of a newly-elected school board that is not as enthusiastic about Core. In addition, there are strained relations between the staff and the school's administration, some of which are union related. However, the presence of some Core material in science and social studies is likely to remain, given that the teachers have developed extensive units for these topics and report that their students are more excited about these subjects since Core began.

Table 28 provides achievement and attendance data in detail for Vine. Outcomes in Table 28 indicate that the 65 students at Vine with complete achievement data based on the Comprehensive Test of Basic Skills (CTBS/4) for the spring of kindergarten and spring of third grade began the study at an above-average level of achievement with a mean-pretest-reading score of 61.5 NCEs (70th percentile) and a mean-pretest-math score of 56.5 NCEs (62nd percentile). By the spring of third grade, performance had increased slightly to 65.5 NCEs (76th percentile) for both reading and math.

The third-though-fifth-grade cohort at Vine could not be followed because we were unable to obtain pretest data in reading and math achievement for those students.

The three-year mean student attendance rate for Vine was 96.2%.

Due to the lack of a control group and complete data for only one cohort, we are limited as to what can be said about the role that Core Knowledge played in the achievement of students at Vine. Based on the scores for the first-through-third-grade cohort on the Core Knowledge subtests, it appears that those students have a strong grasp of the Core Knowledge sequence. Because of limitations in the data previously mentioned, we cannot see how students in the third-through-fifth-grade cohort fared over time on the Core Knowledge test or achievement tests.

Table 28: Vine (MD) Test and Attendance Results

First-through-Third-Grade Cohort	N	Pretest Mean	(SD)	Posttest Mean	(SD)	Gain (loss)
Reading Achievement	65	61.5	(17.1)	65.5	(15.8)	4.0
Mathematics Achievement	65	56.5	(19.0)	65.5	(15.8)	9.0
Core Test: Lang. Arts	90			62.3	(.60; .79)	
Core Test: Science	90			63.5	(.64; .76)	
Core Test: Social Studies	90			61.7	(.55; .66)	
Third-through-Fifth-Grade Cohort						
Reading Achievement						
Mathematics Achievement						
Core Test: Lang. Arts						
Core Test: Science						
Core Test: Social Studies						
Three-Year Mean School Attendance Rate:			96.2			

Newton School (COLORADO)

Location: Suburban area

Student population: 280 students in Grades K-6; 56 in Grades 7-8

Ethnic breakdown:	93.2%	White
	3.6%	Latino
	1.1%	African-American
	0.4 %	Native American
Free- or reduced-price lunch:	6%	
Limited English Proficient:	0	

Special features: Newton is a charter school. Students from the entire district are eligible to apply and are accepted on a first-come, first-served basis. Transportation to the school is not provided. There are currently over 1200 students on the waiting list.

Adoption of Core Knowledge: Newton was founded in 1994 by a group of 10 parents who wanted a "back-to-basics, traditional, fundamental school," with Core Knowledge as a key component. Newton was modeled after a successful back-to-basics school in the district.

Progress of Core Implementation: Teachers began implementing the Core Knowledge curriculum in the 1994-95 school year when Newton first opened. The teachers attempted to incorporate as much of the curriculum as they could that first year. Implementation levels of Core increased in 1995-96 and 1996-97. By 1997-98, in its fourth year, Newton maintains a *moderate-high* level of Core implementation in Grades K-6.

Mean percentages of overall CK content items taught or planned by regular classroom teachers (1997-98): Grade 3: 96%
Grade 5: 82%

Percentage of 3rd and 5th grade classrooms observed exhibiting Core content (1997-98): 50%

Factors impacting Core Implementation: After receiving approval for the Newton charter,[19] the parents hired the principal — a dynamic leader who is very supportive of Core Knowledge and fundamentals education. A board composed of six parents and the principal governs Newton. Many parents work in the school as volunteers. The principal hired the teachers in the summer before the school opened, choosing them in part on the basis of their enthusiasm for the school's approach. All but one were experienced teachers. All teachers were given copies of the Core Knowledge Sequence. They did not receive paid advance planning time to prepare for Core, nor did they receive any staff development related to Core before implementation. In fact, it was only after they had been implementing Core for one year that the school got involved with the Core Knowledge Foundation. However, since that time, the principal has been an active member of the Core Knowledge national network, often giving talks about Core Knowledge implementation in the charter school context. All of the teachers have now attended the Core Knowledge conference, some more than once.

The principal of Newton has been very active in grant writing to support Core Knowledge. Newton received a grant to support Core Knowledge implementation from a foundation, which allowed for the purchase of resources and for teachers to attend the annual conference. Also, the fact that Newton is a charter school has allowed the principal flexibility in allocating resources to support Core. Nevertheless, the school library was rather sparse in the first several years. In 1997, the school received a federal charter school grant that allowed for the purchase of a full computer lab. The computer teacher meets with classroom teachers in order to plan computer lessons that reinforce and extend the Core content that students are learning in their regular classrooms.

Core Knowledge is one piece of the back-to-basics program at Newton. The school's approach is textbook-driven, direct, and utilizes whole-group instruction. Teachers use the Open Court reading[20] and math curricula, which they feel complement Core Knowledge but also make for a very full schedule. The teachers feel as though they don't teach as lengthy units on Core as some other schools, but that they do expose the students to all topics in Core. "We've touched base on all the things listed," stated a teacher. The principal stated: "Core Knowledge only supplements math and reading, but drives fine arts, science, and social studies 100%." At the same time, he said, "We bought into Core hook, line, and sinker for three years, and we feel that it has worked." A committee of teachers has worked to integrate the state standards and county curriculum with Core, and has recently developed a comprehensive set of writing assessments aligned toward all three. Teachers do not have common planning time. However, the principal has recently allocated some staff development days for joint planning. In 1996-97, Newton added Grades 7-8, piloting the Core curriculum for the middle grades.

The district office has become very supportive of Newton, despite its initial wariness of the school's charter status and back-to-basics approach. A district administrator believed that

[19] Initially, the district school board did not approve the charter proposal for Newton, arguing that a back-to-basics approach was not innovative. The state board of education asked the local school board to reconsider, and the charter proposal was approved.

[20] The sixth grade uses the Prentice Hall series instead.

Core Knowledge was a big part of the school's success: "Because you're not rewriting the curriculum every week. This is it. This is what we teach." The students have performed very well on standardized tests, and Newton was recently named as one of five state schools of excellence for the second year in a row. Because this school has been so successful and has such a long waiting list, the parents who started the school worked with the parents whose children were on the waiting list to develop another similar school, which opened in 1997-98. Overall, Core is very likely to remain a stable feature at Newton in the long term.

Table 29 provides detailed information on achievement and attendance for Newton. Data in Table 29 indicate that the 45 first-through-third-grade students at Newton with complete achievement data based on the Iowa Test of Basic Skills (ITBS) began the study at an above-average level of reading achievement (mean reading NCE pretest = 62.7, or about the 72nd percentile). In the spring of third grade, those students experienced a gain in reading achievement of 7.0 NCEs (mean NCE = 69.7, about the 82nd percentile). Those same Newton students began first grade with a slightly higher mean level for math (NCE = 62.0, about the 71st percentile). The group ended third grade with a mean NCE of 61.1 (the 70th percentile), for a 0.9 NCE loss in mathematics based on the ITBS.

Newton's cohort of 24 third-through-fifth-grade students with complete achievement data experienced a gain in both reading and math achievement. The group-mean reading score was above average with an NCE of 62.1 (71st percentile) in the spring of second grade. By the spring of fifth grade, the reading achievement mean had increased 12.1 NCEs to 74.2 (87th percentile). The third-through-fifth-grade cohort started out with a lower mean math achievement score of 55.2 (59th percentile). While the first-through-third-grade cohort experienced a loss from the spring of 1995 to the spring of 1998, the third-through-fifth-grade cohort experienced a gain of 6.9 NCEs to 62.1 (71st percentile).

Table 29: Newton (CO) Test and Attendance Results

First-through-Third-Grade Cohort	N	Pretest Mean	(SD)	Posttest Mean	(SD)	Gain (loss)
Reading Achievement	45	62.7	(22.0)	69.7	(17.6)	7.0
Mathematics Achievement	45	62.0	(15.9)	61.1	(17.2)	-0.9
Core Test: Lang. Arts	52			65.6	(.75; .89)	
Core Test: Science	52			69.3	(.92; .87)	
Core Test: Social Studies	52			66.3	(.80; .89)	
Third-through-Fifth-Grade Cohort						
Reading Achievement	24	62.1	(24.5)	74.2	(17.1)	12.1
Mathematics Achievement	24	55.2	(18.2)	62.1	(15.7)	6.9
Core Test: Lang. Arts	21	64.2	(.68; .69)	61.7	(.56; .81)	-2.5
Core Test: Science	21	62.3	(.59; .81)	64.9	(.72; .72)	2.6
Core Test: Social Studies	21	64.2	(.67; .81)	62.9	(.62; .75)	-1.3
Three-Year Mean School Attendance Rate:			96.3			

The third graders scored about average on the three Core Knowledge subtests (Language Arts, Science, Social Studies) in the spring of third grade. Their scores for Social Studies increased slightly in the spring of 1998 (2.6 NCES) but decreased slightly for Language Arts and Science (2.5 and 1.3 NCES, respectively).

The three-year mean student attendance rate for Newton was 96.3%.

Newton presents a case of a relatively strong implementation of Core Knowledge. Performance on the Core Knowledge test remained relatively consistent from the spring of third grade to the spring of fifth grade. Overall, performance on the achievement test increased from the pretest to posttest or remained relatively constant. However, due to the absence of a matched-control group, we cannot speak conclusively about the efficacy of Core Knowledge at Newton.

VI. Components of Successful Core Knowledge Implementation

From the cross-case analysis of the 12 Core Knowledge schools, we have distilled a list of key components that appear to be present in schools that have achieved successful implementation:

- ***Instructional leadership from the principal.*** Effective principals in Core Knowledge schools are...
  - Knowledgeable about the details of the Core Knowledge curriculum;
  - Willing to accommodate teachers' needs related to the Core;
  - Able to find ways to bring along resistant teachers;
  - Involved in Core Knowledge networks at the local and national levels;
  - Strong communicators to the district and community about the Core;
  - Judicious selectors of other reforms and programs so as to support rather than hinder Core Knowledge.
- ***Teacher willingness to change.*** Effective teachers in Core Knowledge schools are...
  - Willing to believe that all students are capable of learning challenging material at a young age;
  - Willing to commit time and energy necessary to develop and teach units;
  - Knowledgeable of the details of the Core Knowledge curriculum, at all grade levels;
  - Willing to work collaboratively with other members of the school community;
  - Involved in Core Knowledge networks at the local and national levels.
- ***Supportive structures.*** Schools well designed to support Core are characterized by...
  - Funding to support the purchase of Core materials;
  - Advance, paid planning time (ideally in the summer) for teachers to develop and refine units, not just at the beginning of the implementation process, but also over time;
  - Weekly common planning time for teachers;
  - Staff development for Core Knowledge, with topics chosen by teachers;
  - A master schedule and calendar that support teachers' Core activities;
  - An arrangement of space in the school that allows for more flexible teaching and thematic units;
  - A wealth of materials for teaching Core Knowledge (and a well-stocked, Core Knowledge-focused library).
- ***Systemic support,*** which is characterized by...
  - State standards and accountability systems (if applicable) that can be aligned with Core (even if this might take extensive work by school site educators);
  - District support for Core Knowledge, or at least a commitment from the district that they will enable rather than hinder long-term implementation;
  - Parent support for and familiarity with the Core, as well as general school involvement, often gained through deliberate school efforts;
  - Community awareness about Core Knowledge.

VII. Conclusion

Several criteria are typically used by policy makers to determine the success of a reform: effectiveness as determined by improved student outcomes (usually results on standardized tests), fidelity of implementation, and popularity (Cuban, 1998). The effectiveness standard is usually the determiner of the "the usual thumbs-up or thumbs-down verdict on a reform" (ibid., p. 471) However, education historian Larry Cuban (1998) advocates expanding current notions of reform success, which reflect the standards of the policy elite rather than favor practitioner expertise anchored in schools. He argues that when evaluating reforms, researchers should point to "improvements in practice." Expanding notions of reform success, Cuban argues for also assessing the *longevity* of reforms and their standard for *adaptiveness.* An adaptable reform allows for inventiveness and active problem solving among teachers as they use the reform to improve their own practice and change the values, attitudes, and behavior of students on both academic and non-academic tasks.

If measured by both the longevity and adaptiveness standards, Core Knowledge is successful. For 10 of the 12 schools in this study, implementing Core Knowledge rather consistently contributed to making instruction more interesting and content-rich for students and provided coherence to the curriculum. It appears that the provision of a specific curriculum redefined teaching in positive ways. We were surprised to find that teachers mostly saw the provision of a specific curriculum as a relief, rather than as an imposition. One of the reasons Core Knowledge may have been seen as highly adaptable by teachers is that it is a reform that focuses directly on what happens in the classroom, rather than elsewhere in the school.

For Core Knowledge, fidelity and popularity seem inextricably connected. That is, its growth to over 800 schools may well be attributable to the fact that the "Core Knowledge program is not a simple matter of buying materials or following a method. It is an ongoing, collaborative process..." (Core Knowledge Foundation, 1995). There is variation in how Core Knowledge is implemented from site to site, and the Core Knowledge Foundation allows for and implicitly encourages these variations through their loose guidelines for implementation. Yet the Foundation hopes that all Core Knowledge schools will embody the same content in their curriculum, and the large majority of sites in this study did, with the exceptions of variations attributable to how teachers choose to teach the curriculum, and the decision by two sites to not fully implement the reform.

As measured by the reform "effectiveness" standard (student achievement outcomes), our analyses of the Core Knowledge students' scores on norm-referenced, basic-skills achievement tests (i.e., CTBS) did not reveal substantially better outcomes than those for students from comparison schools, except for high-implementing sites in the third-through-fifth-grade cohort. Our analyses did show that students in Core Knowledge schools perform significantly better than their comparison school counterparts on the Core Knowledge Achievement subtests. This is not surprising, as the students in Core Knowledge schools were taught the Core Knowledge content, whereas students in comparison schools were not. However, what the results of the Core Knowledge test do suggest is that students in Core Knowledge schools are in fact retaining the Core Knowledge content they are being taught. Finally, it is important to note that strong correlations between level of implementation and effect size suggest that when schools implement the Core Knowledge Sequence with greater reliability and consistency, students achieved improved outcomes on all tests, including both those which are tied to the Core Knowledge curriculum and normed tests which are not.

VIII. IMPLICATIONS

We found that the changes that resulted from Core Knowledge Sequence implementation were more than just curricular. Core Knowledge turned out to bring a variety of comprehensive changes to schools — a result that was not predicted by our research team nor the Core Knowledge Foundation staff. The changes noted in this report include improved teacher and student engagement, increased parent satisfaction with schools, increased teacher collaboration, and modest student achievement gains on traditional norm-referenced tests.

It bears noting that some of the positive effects associated with Core may reflect the fact that some of the schools in our sample were "pioneers" — among the first schools in the U.S. to achieve full-scale implementation of Core Knowledge. This pioneer spirit undoubtedly suggests a capacity for change that is not present in every school. A high level of functioning is by no means a requirement for schools adopting Core Knowledge. However, it appears that a school that is coping with high turnover in leadership and staff, serious discipline problems, and a dysfunctional school climate may not want to look to Core Knowledge, in the absence of other reforms, to solve all of its problems. Core Knowledge is a reform that is focused specifically on the curriculum — albeit leading to other comprehensive changes in schools over time.

Notwithstanding these considerations, the most plausible explanation for the positive effects associated with Core Knowledge is the greater curricular coherence it creates within individual schools. The features of Core Knowledge that seem to make it work well in schools are its specificity and sequential nature. With Core Knowledge, there is little guesswork for teachers of what to teach. Teachers know what their colleagues are teaching, and this atmosphere allows them to borrow from each other more freely. Core Knowledge implementation produced more clarity of goals, clearly defining "what school means" for the educators implementing the program. Our findings are consistent with the effective schools literature, which has documented significant positive relationships between clear and consensual schoolwide goals and student learning (Edmonds, 1979; Purkey & Smith, 1983; Rutter, Maughan, Mortimore, & Ouston, 1979). It appears that Core Knowledge may help address some of the negative features associated with "loose coupling," in particular that the uncertainty of educational technology contributes to a general lack of organizational consistency and coordination within schools (Meyer & Rowan,1978; Weick, 1976). Core Knowledge increases both consistency and coordination in the curriculum within schools.

These findings suggest the potential positive impact of a content-rich, sequenced curriculum for elementary schools. However, what appears to have mattered most was the fact that the curriculum was specified, rich, and theoretically grounded, and less so that it was Core Knowledge content in particular. This leads us to the conclusion that the benefits associated with a stimulating, rich, well specified curriculum may not be limited to Core Knowledge per se, but instead may be applicable to other specified curricula, based on similar principles of selection, even those developed by schools themselves. Our findings also do not extrapolate to positive evidence for or against teaching the same common core curriculum *across* schools, only *within* them, as such comparisons were not possible with the sample of schools for this study.

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